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PALMS

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OF

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BY THE LATE

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MEMBER OF THE IMPERIAL ACADEMY NATURÆ CURIOSORUM AT BONN: CORRESPONDING MEMBER OF THE ROYAL BOTANICAL SOCIETY OF RATISBON, OF THE ROYAL ACADEMIES OF SCIENCES AT TURIN AND CHRISTINA, HORTICULTURAL AND ENTOMOLOGICAL SOCIETIES, AND SOCIETY OF ARTS, LONDON: MEMBER AND FOR SOME TIME VICE-PRESIDENT OF THE AGRI-HORTICULTURAL SOCIETY OF INDIA.

Madras Medical Establishment.

ARRANGED BY

JOHN M'CLELLAND, F.L.S.,

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ERRATA.

Editor's Preface, first line ; after descriptions, insert *of*.

Page viii last line, for *what* read that.

Page xii { *Calamus collinus* Griff ;—after Fruit spadix, for *CLXXVI* read CLXXXVI.
Calamus leptospadix,—lines 11 and 12 from bottom, omit as follows.

Portions of leaves CXCIV. A. From the Khasyah hills masculine spadix CXCIV. B

Page 38 two last lines but one, for *Tab. CLXXXV. A.* read CLXXXV. B. et vice versa.

„ 40 line 3 from bottom for *Flagillum* read Flagellum.

„ 42 „ 2 from top after A.B. insert *C.*

„ 60 „ 2 from top, omit *A.B.* and for *Tabs.* read Tab.

„ 95 „ 2 „ „ for *Tabs. CXCIII,* read Tab. CCXIII.

„ 101 „ 1 „ „ for *Petioloris* read Petiolaris.

„ 133 „ 2 „ „ omit *Tab. CCXXVII. A.*

„ 134 „ 2 „ „ after A.B. omit C.

„ 155 after *Areca disticha* Tab. CCXXXIII, omit *A.*

THE EDITOR'S PREFACE.

As the descriptions species contained in the following work were writtten by the Author in English, in preference as he expresses it, to the common language of Botanists, the Editor thought it desirable that the definition of the Family, and analysis of the Sections, originally written by the Author in Latin, should be given in English also.

He therefore translated these parts into English, together with the Generic Characters &c. interspersed throughout the work, in order that the whole might be the better adapted to the class of readers for whom the Author, as he tells us in the first paragraph of the preface, intended the work.

In order to preserve the original words of the Author, and to guard against any omissions or misinterpretations into which the Editor may have fallen, the original of such parts as have thus been translated, is given in the form of an Appendix at the end of the work.

This appendix is of the more importance, as it affords the Author's general views of the natural divisions of the Family, no where else to be found in a connected form, and confined to Sub-families, Sections, and Genera, uncumbered with the details of species.

Most of the descriptions of species have been previously printed in the seventeenth, nineteenth, and twentieth numbers of the Calcutta Journal of Natural History. The Editor's duty has therefore been chiefly confined to the reprinting of these, and the incorporation with them of the necessary drawings and illustrations, together with such additional remarks upon species already known, and accounts of undescribed species, as were found interspersed in the Author's papers.

The Editor had at first intended to have added a Glossary of the scientific terms employed in the descriptions of Palms, in order still farther to meet the views of the Author in adapting the work as much as possible to the general, as well as the scientific reader. As however the technical terms employed, do not differ from those in common use in general botany, the reader will find them explained in all modern elementary books on that subject.

The Editor has however, (still acting on the views of the Author), ventured to soften down as far as compatible with scientific character of the work, all technicalities likely to deter the general reader from its perusal and thus becoming if he pleases, with moderate industry in a short time, perfectly acquainted with the names and distinguishing characters of all the Palms of this country.

Of the numerous drawings which constitute an important feature in this work, nine have been derived from Dr. Roxburgh's collection, and two have been contributed by Dr. Wight; all the remainder, considerably upwards of one hundred in number, are derived from the unpublished papers of the Author.

The additional species here introduced from the Author's MSS. and not included in his papers in the Calcutta Journal of Natural History, are as follows, namely *Calamosagus schaphiger* and *Calamosagus ochriger*, *Calamus acanthospathus*, *Calamus geminifloris*, *Calamus macrocarpus*, *Calamus geniculatis*, *Calamus acanthopis*, and *Calamus Wightii*.

Other species regarding which there seemed to be some doubt, together with the Author's investigations connected with *Nipa fruticans*, will be found in the 3rd part of his *Notulæ ad Plantas Asiaticas*, and *Icones Plant. Asiaticarum*, now in progress of publication; and which, with present work, will constitute a lasting monument of the Author's Botanical fame, as well as of the enlightened policy of the Government of Bengal, by which these papers are given to the world.

Calcutta,
Sept. 3rd, 1850.

THE AUTHOR'S PREFACE.

The present attempt, will be found to include all the Palms of British East India that I have met with myself, or of which I have been able to procure such knowledge, as I considered sufficient for their determination. I wish it merely to be viewed as a slight sketch, to be filled up hereafter. This subject, so far as regards Systematic Botany, is one of considerable interest, and in order to meet the convenience of the Indian public, I have written the descriptions in English, in preference to the common language of Botanists. This seemed to me the more proper, because English is the language through which scientific knowledge is communicated in this country, more especially in the Medica and other Colleges, from which all that is to be expected in the dissemination of this science among the Natives o India, must at present be derived. In order to adapt the sketch to this class of students, as well as to others, have prefaced *a few remarks on the general structure and organisation of the Family, as well as on the distribution* of the species, and their uses.

The determination of the species having been difficult, indeed nearly insuperably so to me, in reference to the means possessed in India, the numerous names new to science proposed in this work, must be taken with some qualification. I shall never regret to see any of these names cancelled in favour of others *justly* prior, that is to say, prior by definition, and by publication. However imperfect the definition may be; and it must be confessed, that most of those of palms are necessarily imperfect, still it bears evidence of a wish on the part of an author, to do his duty by the science, for which moreover, he thus endeavours to show a proper respect. But I would not be disposed to waive my right, in favour of mere MSS names originating in indolence, and too often fostered by a courtesy of a very mischievous nature, inasmuch as the practice is directly opposed to proper observation, and due discrimination. Such names are in fact, only weak and temporary usurpations of authority.

The materials from which it has been prepared, are an extensive collection of palms made by myself and friends in various parts of British India, more especially at Malacca, and in Assam, and of a few found in the Botanic Gardens. To which must be added, the species figured in ROXBURGH's national collection of drawings, and most of those described in his *Flora Indica*. The species of BUCHANAN HAMILTON, amounting to nine in number, I have not been able to determine, in default either of MSS, specimens, or drawings.

As might be expected, I have been much assisted by PROFESSOR VON MARTIUS' great work on Palms, so far as regards the Sections, and from DR. MOHLS' contribution to it, I have derived most of what relates to Structure.

In endeavouring to define the genera, I have been guided by ideas consonant, I think, with the general state of

Systematic Science, which appears to me to be founded on a due gradation in the value of characters. Such for instance as, that the higher groups of whatever rank, should be defined by major characters of distinction, and the subordinate, by minor characters of distinction. Hence, the genera are limited to such groups as present positive marks of distinction; and all such as differ in less essential or negative points, should make their appearance as sub-genera of their respective genera. In my opinion it is inconsistent to apply to Genera, rules which are not applied to Families, in which extreme principles of primary division have not yet, I think, been advocated. Practically, I am satisfied, that the great end of Systematic Science, determination or identification, is much easier attained by bold synthesis, than minute analysis. *Calamus* therefore appears in this work, as an integral genus.

I have not considered it advisable to adopt the distinctive name of this Section or Sub-Family, proposed by Dr. Martius. For though applicable to a great peculiarity, still it is derived from a form indistinguishable from *Maurita*, which is itself to be considered as a genus less entitled to give its name to the group, than the complicated and extensive genus, *Calamus*.

There are few, if any sound marks of distinction between the genera of this section. *Calamus* which is by far the most extensive and complicated, has not invariably ruminated albumen; and by the presence of a lateral umbilicus, may be considered as passing into *Zalacca*, which has the umbilicus terminal. It likewise presents occasional instances of acidity of fruit, and the species represent even in habit, the characteristic forms of *Zalacca*.

Zalacca differs only from *Sagus* in habit, approximating to it however, in *Zalacca conferta*, by the bracts, the tegument of the seed, and the albumen.

Sagus, besides having the ordinary fruit of *Calamus*, with the ordinary inflorescence of *Zalacca*, passes directly into both, by those remarkable Palms composing its second Section. And if the ordinary opinions of their affinities with *Raphia* be adopted, the genus may be considered also as passing into *Calamus*, by means of the inflorescence.

Plectocomia, is at present perhaps more capable of definition, yet its habit is altogether that of *Calamus*, from which it differs probably in no irreconcilable manner. In its spathes it may be considered as approaching to *Sagus*. And in the hispid fruit, to *Zalacca*.

Eugeissona appears to be the most limitable genus. For although in the others with solitary flowers, the presence of the bracteoles may be considered as shewing the flowers to be terminal, yet this is with reference to the branches, not the spike. But as reconciling this peculiarity, it may be proper to observe, that the development is in all, centrifugal.

I have reduced *Dæmonorops* to a Section of *Calamus*, from the common forms of which, it differs only in the comparative completeness and permanence of its spathes. These characteristics however, disappear in those *Calami* of the Section *Platyspathes*, excepting the great concavity of the spathes, and the contracted branches of the inflorescence.

The arrangement of the genus *Calamus* submitted in the following pages, will I think, be found practically useful, although in this respect, it is even in the Indian species, weakened by at least two sufficiently marked exceptions.

I have likewise been desirous of adopting the plan of putting in Italics, those characters what I consider distinc-

tive. By which, not only is the enquirer at once directed to the necessary words of distinction, but the author himself is thus led to distinguish such as he confesses to be unnecessary. This, as it must lead to the reconsideration of characters, and to their due curtailment, appears to me the only mode by which it can be hoped to arrive at highly desirable brevity and perspicuity. The difficulty of the subject, and the limited state of my own knowledge of the species described, founded rather on casual observation, than on physiological study, will I trust induce the reader to make allowance for the imperfect manner in which these views have been here carried out.

Palms, although so diversified in structure, form one of the most marked Natural Families of Plants; they are therefore distinguishable at first sight, in all stages of their growth. By common consent, they appear to be considered as the most typical of Monocotyledonous Plants. LINNÆUS, and still later, ENDLICHER, styled them *Principes*, or the Nobles of their Class; by VON MARTIUS, they are distinguished as the splendid offspring of Terra and Phæbus. And I believe they are mentioned by DR. LINDLEY in the *Fossil Flora of great Britain*, as possessed of as high or perfect an organisation as Dicotyledonous Plants.

Their relative perfection with other Monocotyledones may however, I think, be reduced to the size and woody nature of the trunk, the coriaceous texture and division of the leaves, and in many instances of the spathes or the modified leaves protecting their inflorescence. But as regards the flowers, except perhaps their tendency to separate sexes, they present few of the suppressions of development, cohesions, and other irregularities of parts, on which, in my opinion, considerations of relative perfection ought mainly to depend. The fruit however, is in many special cases more complicated than that of other classes. In their powers of perpetuating the species, they hold also a high rank, although this may be considered in some measure counterbalanced by their limited duration, and small power of reproducing the individual by grafts or buds.

They can only be considered as perfect as Dicotyledonous Plants, in being as perfectly adapted to their state of existence. In comparative perfection, it would not I think, be difficult to shew them to be decidedly inferior. They do not perhaps in the *career* of any one organ, present that variety of development which we observe among Dicotyledons, to which in fact they only approach in the division and texture of the leaves, and their often highly developed fruit.

The first peculiarity presented by the flowers of Palms, is their coriaceous texture, so different from other Monocotyledonous flowers, the absence of colour, and a general tendency in appearance, to the characteristic form of the flowers of grasses and rushes

They present but little deviation from the usual alternation of parts, very rarely presenting any irregularity in this respect. Although the two floral envelopes, namely, Calyx and Corolla, are more distinctly placed on two different planes, than is commonly observed in Monocotyledonous Plants generally, yet they present notwithstanding, little difference in the colour and appearance of these parts.

The Corolla is however, more developed than the Calyx. Both, generally have a striate appearance, due to the deposit and prominence of the *ferras*; generally, both are tough, coriaceous, and often siliceous.

While the *Calyx* is often imbricated, the *Corolla* is much more frequently valvate, perhaps always so in the male flowers, and in the female so generally, that the Corolla in those cases in which it is said to be imbricated, probably does

not exist, the envelopes consisting in such cases, (as the cocoa-nut palm), of an imbricated series of bracts and sepals.

In *Corypha*, and *Borassus*, the consistence is less coriaceous than in others. Altogether, there are few marks practically applicable to Generic or Sectional distinctions, to be drawn from either of the two floral envelopes.

The chief irregularity in the flowers, is the separation of the sexes, which takes place to a great degree. Indeed, only one Section, (which as regards the inflorescence, is less aberrant than the others), is characterised partly by hermaprodite flowers.

The separation of the sexes, is either complete in distinct individuals, or incomplete on distinct spadices, or still more incomplete on the same spadix. In the latter case, the males occupy the extremities of the spadix, and the females the base: when dioecious or sex-divided, the males are generally far more numerous than the females.

The male organs, have not appeared to me to present any thing remarkable, they are altogether of the ordinary type. The only curious circumstance I have observed, is the constant adhesion of the filaments to each other, and to the corolla at the base of its segments, so that its tube, whether it be short or long, is always lined by a layer, of combined filaments, which becomes distinct where the petals cease to be united.

The effect of this is, that those only have hypogynous stamens, which have tripetalous corollas.

The ovary before fecundation, presents little diversity or complication, it is almost always composed of three-carpels more or less united, sometimes of two; it is generally of thick consistence.

The number of cells to each component part of the ovary, is as it should be, one; and this contains an ascending anatropous ovule.

There is nothing remarkable about the style, or the stigmas, which are papillose surfaces lining the inner surface of the branches of the style, or the stigma is in some instances perhaps, sessile.

But the pistil presents little variety, and that confined merely to its surface in the sub-family *Calaminæ*, yet in its progress to maturity, it undergoes so many changes, that the fruit becomes an excellent source of generic distinction, and presents as much diversity as that of any other family.

It is almost always characterised by a tendency to the abortion of two of the cells of the pistil, and three-celled fruit are consequently comparatively rare.

The simplest form is exemplified in *Licuala*, and *Corypha*. In *Areca*, the fruit is more complicated by the deve lopment of fibres. In *Cocos* it reaches perhaps to its greatest degree of complication.

I am not able for reasons to which I have had, and shall have, frequent occasion to recur, to give an accoun of the actual number of Palms known up to this date, to be indigenous to British India. The number of specie in ROXBURGH'S *Flora Indica* is 41*; of these, 23 have been represented in ROXBURGH'S drawings deposited in th Botanic garden, *i. e.* the proportion of 1 in 80 of the whole number of plants described by that author.

The number of species in the Catalogue of dried Plants of Dr. BUCHANAN HAMILTON, is 9,† or 1 palm to every 288 plants of other kinds collected by that Botanist.

* Referred to Phœnix, *Wrightea, Corypha, Licuala, Caryota, Saguerus, Bentinckia, Areca, Borassus, Cocos, Calamus, Sagus, and Nipa.*

† *Calamus* 4, *Licuala* 1, *Phœnix* 1, *Harina* 1, *Areca*, 2.

The number of species in the general Catalogue of the *Herbarium Indicum* distributed in Europe, are few, but it is to be gathered from DR. MARTIUS' great work on the History of Palms, that a good many species had been communicated to him from India; of these I cannot give an account, from the only copy of the work in question to which I have access, being incomplete.

So far however as my materials go, it may be stated, that at least—species are already published as indigenous to British India. The number in the present work, exceeds that number by—.

Of the probably total number indigenous to British India, I have no means of giving an approximate estimate. None or almost none exist to the west of the river Gogra, but between the Gogra and the Mishmee mountains to the east and along the whole frontier line from that point to Singapore, including the Khasya, Naga, and Tipperah hills, a considerable number may doubtless be expected. With regard to the Malacca Palms, which have added so considerably to the list, (though I may state, that I have collected almost all to which the Malays give distinct names), a considerable number of species doubtless still exist *in the* interior, and on the eastern Coast of the Peninsula. while many may also be expected from the western Coast of India itself.

Still, I do not see sufficient grounds for supposing with DR. MARTIUS, that British India contains so many unknown species, as will, in any sufficient degree, assist in swelling the total amount of the Family to 1,000 Species.

DESCRIPTION OF PLATES.

IN the following list, those plates marked with an asterisk are taken from the unpublished collection of Roxburgh's Drawings: all others are from the Author's Posthumous papers, except two marked thus, †, which were communicated by Dr. Wight.

MALACCA.

Areca edulis, Blume *Koombar* of Penang. Portion of a leaf and Spadix CLXXV.

Areca affinis Griff.—Portion of the Stem and the lower part of Leaf, CLXXVI. A. Portion of a Leaf and Spadix CLXXVI. B. Spadix and Fruit, CLXXVI. C.

Areca secunda Griff.—Spadix, CLXXVII.

Areca macrostachya Griff.—*Runjun* of Malacca. Portion of Stem, and the lower part of a Leaf, CLXXVIII. A. Portion of a Spadix CLXXVIII. B. Sketch of the whole Plant CLXXVIII. C.

Areca glabrescens Griff.—*Saluk* of Penang; male and female Spadix, with the portion of a Leaf CLXXIX.

Areca conferta Griff.—*Koloobee* Penang, *Assam-paiya* of Malacca; portion of a Leaf CLXXX. A. Immature Fruit-spadix CLXXX. B. Mature Fruit-spadix CLXXX. C.

SAGUS.

Sagus konigi Griff.—Part of the Spadix CLXXXI.

Sagus levis.—Spadix with Fruit CLXXXII.

DESCRIPTION OF PLATES.

CALAMOSAGUS.

Calamosagus lacinosus Griff.—Spadix CLXXXIII.

Calamosagus (harinæfolius) Wallichiæfolius Griff.—Spadix and portion of a Leaf CLXXXIV.

Calamosagus schapiger Griff.—*Rotang simote* Malacca, a complete leaf CLXXXIV. A.

Calamosagus ochriger Griff.—Parts of the flower CCXVI. Fig. I.

CALAMUS.

Calamus castaneus Griff.—*Rotang chochoor* Malacca; Spadix CLXXXV. A.
Male and female Spadices, CLXXXV. B. Fruit-spadix of the same CLXXXV. C.,

Calamus collinus Griff.—Khasyah hills, on rocks at the lower part of the ascent to Churra Punjee. The upper pa
of a leaf and Fruit-spadix, CLXXVI.

Calamus macrocarpus Griff.—Part of a Fruit-bearing Spadix, with a section of the Seed, CLXXXVI. A. Figs. I, II

Calamus Jenkinsianus Griff.—Fruit and Section of the Seed CLXXXVI. A. Fig. III.

Calamus exilis Griff.—*Rotang gonoon.* The Seed CLXXXVI. A. Fig. IV., dorsal, ventral, and side views longitu
Section &c.

Calamus schizospathus Griff.—From the Khasyah hills; portion of the lower par of a leaf and two Sp
ces, CLXXXVII.

Calamus arborescens Griff.—Portion of a Leaf, and Stem CLXXXVIII. A. Spadices, CLXXXVIII.
Entire plant from a specimen in the Bot. Garden Jan. 1843. CLXXXVIII. C.

Calamus longisetus Griff.—Portion of a Leaf and Stem, CLXXXIX. A. Inflorescence &c. CLXXXIX. B.

Calamus acanthospathus Griff.—From the Khasyah hills; part of a Fruit-spadix, CXC. A. Fig. I.
Portion of a fruit spadix, CXC. B.

Calamus Royleanus Griff.—From Deyrah Dhoon. Upper portion of Leaf, and Fruit-spadix, CXCI.

Calamus Roxburghii Griff.—(*C. Rotang* Roxb.) Leaves and Spadices CXCII.

Calamus tenuis Roxb.—From the banks of Jeels in the Sylhet district; portion of a Leaf and Spadix, CXCIII. A
Spadices and portion of a leaf from Assam, Natural Size, CXCIII. B.
Spadices leaf &c. CXCIII. C.*

Calamus leptospadix Griff.—Portions of Leaves, CXCIV. A.
From the Khasyah hills masculine Spadix, CXCIV. B.
From Assam. Fruit-spadix, Inflorescence, portions of Leaves &c., CXCIV. C.

Calamus fasciculatus Roxb.—From the banks of the Boorak river in the north-eastern part of Bengal. The upp
portion of a Leaf and Inflorescence CXCV. B. (the latter doubtful, rather perhaps th
of C. tenuis). Part of a Fruit—bearing Spadix, and long section of a Seed CXC. A. Fig. I
Inflorescence leaves &c., CXCV. A.*

Calamus gracilis Roxb.—Portion of the Stem, Leaf, Inflorescence, and parts of the Flower, CXCVI.*

Calamus floribundus Griff.—From the confluence of the Noading with the Burrumputra, in Upper A
sam, Part of Inflorescence and a Leaf, CXCVII.,

Calamus latifolius Roxb.—Portion of the Stem, Leaf, Inflorescence, and one of the Leaflets; the latter bei
natural size, CXCVIII.*

Calamus palustris Griff.—Mergue Herb. no. 520. Leaf and Inflorescence, CXCIX.

Calamus geminiflorus Griff.—Inflorescence Leaves &c., CXCIX. A.

Calamus verticillaris Griff.—*Rotang Chinchin* (male called *Rotang Goonjull).* Malacca. Upper part of Stem with the bases of Petioles and portion of the Inflorescence, CC. A.

A branch of the Fruit-spadix. Nat. size, CC. B.

Portion of the Stem and the Inflorescence complete, half the natural size, CC. C.

Calamus Draco.—The *Jaruang* of Penang. Spathes CCI. A. Fruit-spadix CCI. B.

Calamus geniculatus Griff.—The *Doodoo* of Penang. Part of a leaf. CCII. A. Fruit spadix CCII. B.

Calamus longipes Griff.—*Dodow* of Malacca. Base of a Spathe, part of a Stem and the Fruit-Spadix CCIII. A.

Mature Fruit-spadix, CCIII. B.

Calamus Hystrix Griff.—*Rotang sabote* of Malacca. Part of the Petiole and Leaf CCIV. A.

Inflorescence and Stem CCIV. B.

Fruit-spadix, Stem and bases of the Spathes, CCIV. C.

Calamus leptopus Griff.—*Rotang chinchin* of Malacca. Inflorescence CCV. A. The upper portion of the Stem with bases of Petioles, Spathes &c., CCV. B. Masculine Flower, CCXVI. Fig. IV.

Calamus Mastersianus Griff.—No. 1201 Assam collection. Inflorescence complete CCVI.

Calamus ramosissimus Griff.—From Malacca. Inflorescence complete CCVII.

Calamus nutantiflorus Griff.—Inflorescence and Spathes, CCVIII.

Calamus (Demonorops) *grandis* Griff.—*Rotang sumambo* of Malacca. Portion of a Leaf, Stem, and a Spathe CCX. A.

Stem and spathe. CCX. B.

Bases of spathes and fruit and spadices, CCX. C.

Calamus (Demonorops) *intermedius* Griff.—*Rotang Chrysa* of Malacca. Portions of the upper and lower parts of a Leaf, CCXI. A.

Spathe, Petiole and portion of Stem, CCXI. B.

Calamus (Demonorops) *Lewisianus*, Griff.—*Kicham* of Penang. Portions of a Leaf. CCXII. A.

The upper part of a stem with Spathes, Petioles and Fruit-spadices, CCXII. B.

Calamus angustifolius Griff.—The upper part of a Leaf, a portion of the Petiole, and Inflorescence, CCXIII. A.

Portion of the Stem with the lower part of a Leaf attached, and different views of Spathes, CCXIII. B.

Calamus (Cymbospathe) *hygrophilus* Griff.—*Rotang Ayer* of Malacca. Portion of a Stem, the base of a Petiole and a Spathe complete CCXIII. C.

Calamus (Demonorops) *monticola* Griff.—The upper part of a Leaf CCXIV. A. Fruit-spadix, Spathes, the Petiole and base of a Leaf, all attached to a portion of the Stem, CCXIV. B.

Spadices, with Spathes and Spathules complete CCXIV. C.

Calamus (Demonorops) *calicarpus* Griff.—*Rotang chochoor* of Malacca. Mature and immature Fruit-spadices and a Spathe detached CCXV. A. The sheathing base of Petiole, views of Spathes, and a Spadix without the external Spathe CCXV. B. Fruit-spadices leaves &c., attached to the Stem CCXV. C.—Mature Fruit-spadix, CCXV. D.

Calamus (acanthopis) Kirtong Griff.—The leaf of this is the *Kochum* of Penang, and is a *Kaloobe* or Zalacca, the spadices are those of Demonorops. It is the *Rotang Kirtong* of Malacca. Spadices and portion of a Leaf CCXVI. B.

Calamus Wightii Griff.—Fruit-spadix with detached Fruit, sections of Seed &c., CCXVI. C.†

Calamus petiolaris Griff.—Male Flowers CCXVI. Fig. VII.

PLECTOCOMIA.

Plectocomia elongata Mart.—Part of a feminine Spadix, CCXVII. A. Another more complete, CCXVII. B. Branch of a Fruit-spadix, CCXVII. C.

Plectocomia Khasyah Griff.—Spadix, with figs. *b,b*, a mature Fruit, and section of the Seed, CCXVIII.

Plectocomia Assamica Griff.—Mature Fruit and section of the Seed. Figs. *a, a*, CCXVIII.

Plectocomia Himalayana Griff.—A branch of the Spadix, a portion of the Leaf, and the parts of the flower of a specimen from Darjeeling CCXIX.

EUGEISONA.

Eugeisona triste Griff.—*Bertam* of the Malays. Sketch of the entire plant at Ching hill Malacca, Oct. 1842. CCXX. Portion of a Stem as well as of a Leaf detached CCXX. A. Young Panicles CCXX. B. More advanced Panicles in fruit, CCXX. C.

CORYPHA.

Corypha elata Roxb.—The entire plant, with a branch of the Spadix and parts of the Flower and Fruit CCXX. I

Corypha taliera Roxb.—Entire plant CCXX. E.* Branch of the Spadix, a Leaf, a Fruit, and Sections of the latter together with Flower enlarged. CCXX. F.*

LICUALA.

Licuala paludosa Griff.—*Anglice* Penang Lawyer, a complete Leaf CCXXI. A. Inflorescence CCXXI. B. Apex of Stem with bases of Petioles &c., CCXXI. C.

Licuala peltata Roxb.—Entire Plant, with sections of Fruit, the latter by the Author CCXXII.*

Licuala acutifida Mart.—Leaf and Petiole CCXXII. A.—Apex of Stem with a branch of Inflorescence, the parts of the Flower, together with sections of the Seed CCXXII. B.

Licuala glabra Griff.—Part of the upper portion of the Stem, an entire Leaf with portion of the Inflorescence and portion of the Fruit-spadix with Fruit, Seed, and sections of ditto, CCXXIII.

Licuala longipes Griff.—An entire Leaf with the upper part of the Plant, showing the form of the Leaves and Inflorescence CCXXIV. A.—Upper part of the Stem and Inflorescence CCXXIV. B.

Licuala triphylla Griff.—Entire plant in Fruit, with a section of the Seed &c., about ¼ size, CCXXV.

LIVISTONA.

Livistona Jenkinsiana Griff.—Leaf CCXXVI. A. Inflorescence with Spathes complete, together with Fruit, and the parts of the Flower magnified, CCXXVI. B.

Livistona spectabilis Griff.—*Sardang* of the Malays. Entire plant with a portion of the Fruit-spadix, the Seed and a section of the latter, CCXXVI. C. This beautiful Palm is 50 or 60 feet high.

Livistona Sinensis Mart.—Entire plant from a specimen in the Botanic Garden Calcutta, CCXXVI. D.

CHAMÆROPS.

Chamærops Khasyana Griff.—Leaf, with portion of the Petiole, and apices of divisions of the Leaf detached natural size CCXXVII. A.

Fruit-spadix, with Seed detached, and a section of a Seed magnified CCXXVII. B.

PHŒNIX.

Phœnix acaulis Roxb.—An Entire plant, the feminine Inflorescence detached. Nat. size. CCXXVIII.*

Phœnix sylvestris Roxb. The *kujjoor* of Bengal. Portion of the a branch of Fruit-spadix, Vegetation of the Seed, the young plant and Sections of the Stem CCXXVIII. A. 1. Young plant, the first frond having appeared above ground. 2. Do. Do. the vaginæ removed, shewing the attachment of the frond to the axis. 3. Sections of the axis, the round marks indicate the situation of vascular fascicles. The tissue is close and grumous. 4. Section of a radicle, shewing the existence of large cells between the centre and the cuticle, and the origin of a young radicle from the central part. 5. Seed. 6. Longitudinal section; nearly the whole of the horny part is converted into loose cellular spongy substance. 7. Transverse section of the unexpanded part of the process which is sent off from the hilum, agreeing in structure nearly with the radicles. 8. Expanded part of do. the difference in appearance dependant on the expansion.

Phœnix paludosa.—Feminine Spadix, portions of the Petiole and a Leaflet CCXXIX. A.

An Entire plant from Nature, with a masculine Spadix detached CCXXIX. B.

ARECA.

Areca triandra.—Entire plant together with a young plant, also shewing the Structure of the Stem CCXXX. A.

Areca Cocoides. Penang Punowar of Malacca.—Entire plant CCXXX. B. It is almost as tall as the Cocoa-nut Palm. Trunk annulated, thick below and sensibly diminishing upwards. Leaves spreading. The tree of which I only saw a single specimen to make the sketch from, was so crowded with others such as Cocos, that I did not get a good view of it. Its appearance, when near, is different from that at a distance, judging from another specimen seen at *Sawnent malim* (here also represented) which presents a Zamianine or Taxine aspect; the leaflets appearing all to be ascending, secund, and the leaves premorse.

Areca Malaina Mart.—Portions of the Stem with Fruit-spadices and Spathes CCXXX. C.

Areca Dicksonii Roxb.—Inflorescence and parts of the Flower as well as Pinnules CCXXXI.*

Areca gracilis Roxb.—*Girgoa* of Assam. An entire Leaf CCXXXII. A.—Leaves and Fruit-spadix CCXXXII. B. See the observations on the varieties of this species p. 155. Portions of the Stem with Spikes ½ nat. size CCXXXII. C.

Areca paradoxa Griff.—Fruit CCXXXII. C. Fig. II.

Areca disticha Roxb.—Upper portion of the Plant and a portion of the Stem with Spikes in fruit and flower CCXXXIII. A.*

Areca tigillaria Jack.—*Nibong* of Malacca. Entire plant CCXXXIII. B.

Areca horrida Griff.—*Bhyass* of Malacca. Entire plant CCXXXIII. C.

SLACKIA.

Slakia geonomæformis Griff.—Upper part of the Stem with branches of Inflorescence, together with the Entire Plant CCXXXIV.

ARENGA.

Arenga saccharifera. Anowe Malacca. CCXXXV. A. This of all Palms is the most beautiful. Its stem is adorned with bundles of black, fibres incircling the petioles, and surmounted by a large dense dark green crown. Some of the pinnules, are horizontally, and other ascendingly curved. The fibres are a most useful material for cordage.

Arenga Westerhoutii Griff.—*Langkup* of Penang. Middle part of Leaf CCXXXV. B. Lower part of Leaf CCXXXV. C. Apex of a Leaf CCXXXV. D.

Arenga Wightii Griff.—Spadix complete, the parts of the Flowers, together with part of the Fruit-spadix and sections of the Fruit CCXXXV. E.†

CARYOTA.

Caryota (obtusa) obtusidentata Griff.—Part of a Leaf. CCXXXVI. A. Branches of masculine Spadix CCXXXVI. B.

Caryota sobolifera Mart.—*Tukuss* of Malacca. Entire plant in Flower CCXXXVI. C.

HARINA.

Harina caryotoides.—Entire plant CCXXXVII.

Harina oblongifolia Griff.—Male Spadix CCXXXVII. A. Female Spadix CCXXXVII. B. Fruit-spadix of specimens received from Major Jenkins CCXXXVII. C.

Harina (ORANIA) *nana* Griff.—Leaves and Spadices CCXXXVIII. A. Leaf, Inflorescence, and parts of the Flower, together with a Fruit-spadix, and sections of th Fruit and Seed. CCXXXVIII. B.

MACROCLADUS.

Macrocladus sylvicola Griff.—*Ebool* of Malacca—Part of a Leaf, and an Entire Plant. CCXXIX. A.B.

PALMS

OF

BRITISH EAST INDIA

BY THE LATE

WILLIAM GRIFFITH.

PALMACEÆ.

They are ligneous perennial plants, increasing by the growth of new matter at the apex. ROOTS slender, numerous, cylindric, simple, or branching in the form of a dense inverted conical mass of fibres, increasing by the growth of new matter at the points.

TRUNK arboreous, ligneous, cylindric, often simple, seldom forked, often climbing, naked, and ringed, or rough from the dilated petiolary sheaths or scars, (in one genus, NIPA, rhizomatous.) LEAVES plaited, coriaceous, fan-shaped or pinnate, and in the erect species closely inserted together, forming a terminal crown; in the climbing species, they are inserted at distant intervals along the stem. PETIOLE in some elongated and whip-like, its sheath often formed of reticulated fibres, and with the petiole, is armed with spines or thorns; LAMINA large, fan-shaped or pinnate, originally in the young state plaited, then often when mature, longitudinally torn in the direction of the secondary veins, pinnules longitudinally veined, coriaceous, often clothed with ragged wool, or scurf. INFLORESCENCE terminal or axillary, in some varieties spadicose. SPADIX often branching, sometimes enclosed within one complete spathe, or coved by several incomplete imbricated spathes, and sometimes flagellate or prolonged and whip-like. FLOWERS small, either monœcious, diœcious or polygamous, rarely hermaphrodite, sometimes seated in a cup-shaped depression in the substance of the rachis, inconspicuous, membranous or coriaceous, solitary or double, both being masculine) or treble, in such case one feminine is placed between two masculine, or aggregate: in monœcious species the feminine are placed towards the base, and the masculine towards the apex of the spadix. PERIANTH double, both trifid, more or less coriaceous, glumaceous, seldom coloured, persistent. CALYX three sepalous, sepals either distinct or more or less united, æstivation often valvate. COROLLA three petaled, petals somewhat like the sepals, distinct, or more or less united, æstivation often valvate.

STAMENS hypogynous, or alternately adhering to the corolla, as it were, perigynous; often six, of which three are opposite to the sepals, and three opposite to the petals; seldom indefinite, and more rarely three in number, but often rudimentary in feminine flowers. FILAMENTS often monadelphous at the base. ANTHERS introrse, bilocular with a longitudinal dehiscence. POLLEN elliptical, or between elliptical and spheroidal, longitudinally cleft; sometimes bristly.

PISTIL free, very often composed of three carpels; carpels more or less united; and existing in a rudimentary state in masculine flowers. STYLES corresponding in number with the carpels, but sometimes fewer, more or less united. STIGMA simple. OVARY single, free, three celled, (rarely one or two celled) or three, one celled. OVULES often solitary, erect, anatropous, ascending.

FRUIT solitary or triple, either berries or drupes, often one seeded, in one tribe, the scales are reversely imbricated, in another the putamen is provided with three pores. SEED often solitary, ALBUMEN either horny or cartilaginous, solid or hollow in the centre, either even on the surface or more or less ruminate. EMBRYO monocotyledonous, round or pulley-shaped, erect, often situated behind, remote from the hilum and imbedded in albumen. PLUMULE included, inconspicuous; the germinating extremity of the cotyledon being produced in a pre-existing cavity, which is formed and increased by liquefaction in the centre of the albumen.

Palms Comprise The Following Subdivisions.

I. CALAMINÆ.*

LEAVES, PETIOLARY SHEATH *often armed with straight, subulate or curved spines,*† LAMINA pinnate, (in one genus round or fan-shaped.) LEAFLETS often linear, margin and upper surface bristly. INFLORESCENCE, spicately or racemosely paniculate. SPATHES except in one genus (CERATOLOBUS,) many, incomplete. FLOWERS polygamously monœcious or dioœcious, both sexes valvate, tribracteate, solitary or in pairs, when both are masculine, or one is feminine, the other, either hermaphrodite or masculine. PERIANTH striated with veins. COROLLA indurated, often cuspidate. STAMENS 6, seldom 12, in one instance they are indefinite. OVARY three celled, scaly or husky. OVULES solitary. FRUIT solitary, from 1 to 3 seeded, often dry, scaly; scales horny, often shield-like, reversely imbricated. ALBUMEN furrowed on the surface, excavated internally, or uniform. EMBRYO placed *at the back* or near the base.

They are shrubby, and often climbing or arboreous palms, mostly tropical, their northern limits in India being about the 29th or 30th degree of north latitude.

The greater part of this sub-family belongs to British East India. Very few American species have been found, and these for the most part belong to aberrant types.

USES, the arboreous trunks of a few are rich in Sago. The slender stems of shrubby and of climbing species, supply Walking-sticks, material for Wicker work, and other purposes of Art. The leaves supply an equally simple and convenient Thatch for houses.

* This name is here proposed, because *Calamus* appears to have the best claims to be considered the typical genus. *Lepidocaryum* moreover, which has hitherto given its name to the division, is not, I think, distinct from *Mauritia*.

† The terms here applied to the armature of these plants are not to be taken in their strict sense, which is not properly applicable to the general Monocotyledonous structure. If the thorns are of considerable size, I call them spines; if small, and especially if hooked, I call them aculei.

SECT. I. *Leaves Pinnate.*

1. ZALACCA.

INFLORESCENCE spikately paniculate. SPIKES amentaceous. BRACTEOLES membranous, woolly. FLOWERS in pairs. TEGUMENT of the seed berried. ALBUMEN excavated at the apex. Perennial almost stemless palms, without a flagellated prolongation of the petiole.

2. SAGUS.

INFLORESCENCE spikately paniculate. SPIKES amentaceous. BRACTEOLES membranous, woolly. FLOWERS in pairs. ALBUMEN surface ruminated. FRUIT composed of a single carpel. Arborescent palms flowering only once, and without a prolongation of the petiole.

3. CALAMOSAGUS.

INFLORESCENCE spikately paniculate. SPIKES amentaceous. BRACTEOLES membranous, woolly. FLOWERS solitary. ALBUMEN surface ruminated and excavated at the apex. LEAFLETS wedge-shaped, gnawed at the end. LIGULA large, and above, boat-shaped. Perennial climbing palms. Petiole prolonged and whip-shaped.

4. CALAMUS.

INFLORESCENCE spikately or racemosely paniculate. SPIKES (sometimes racemes) filiform, masculine compressed, in two rows. FLOWERS solitary. BRACTEOLES smooth, and united with the masculine flowers into a cup. ALBUMEN excavated, or ruminated on the surface. Perennial palms, often climbing, and often with the spadix or the petiole extended to a whip-like prolongation.

5. PLECTOCOMIA.

INFLORESCENCE racemosely paniculate, the branches of which are tail-shaped. SPATHES in two rows, imbricate, persistent. SPIKES filiform. FLOWERS solitary. FRUIT rough scaly. ALBUMEN uniform. Perennial climbing palms. Petiole prolonged.

6. EUGEISSONA.

INFLORESCENCE paniculate. FLOWERS solitary, terminal. BRACTEOLES numerous, imbricated and stalked. STAMENS indefinite. ALBUMEN solid, with six external grooves. Perennial almost stemless palms, without a prolonged petiole.

SECT. II. *Leaves Fan-shaped.*

7. MAURITIA.

Natives of Tropical parts of America.

II. CORYPHINÆ.

LEAVES *often fan-shaped, rarely pinnate.* INFLORESCENCE axillary, seldom terminal. SPATHES several, incomplete, sheathing, rarely single and complete; secondary spathes sometimes wanting. FLOWERS hermaphrodite, seldom polygamous, rarely dioecious. OVARIES three, distinct or partly cohering. FRUIT a berry or a drupe,

generally solitary, one ovary only being matured, 1-seeded. ALBUMEN horny, equal, solid or excavated in the centre, or having an entering cavity lined with the tegumentary coats, or the surface itself is sub-ruminate. EMBRYO dorsal, seldom situated at the base. Either perennial or flowering only once, shrubs or trees.

SECT. I. *Leaves Fan-shaped.*

SPADIX in perennial species axillary, in species flowering only once, terminal, large. SPATHES many, incomplete, sheathing. FLOWERS sessile, solitary, or often clustered, colourless and inconspicuous, 1-bracteate. COROLLA valvate, petals 3-6. STAMENS 6, in tripetalous flowers free, hypogynous, in others perigynous, having the filaments often united into a ring adhering to the throat of the corolla. ANTHERS versatile. OVARY often vertically sculptured. BERRIES drupaceous, olive-coloured, red or blue. SEED externally smooth, or (in CHAMÆROPS) vertically sulcate. ALBUMEN excavated in the centre, or having an entering cavity lined with the outer teguments, or (in CHAMÆROPS) externally furrowed, sometimes ruminate.

Inhabitants of tropical parts of America, New Holland, and Asia, especially the eastern Archipelago, and India beyond the Ganges. One species however belongs to the shores of the Mediterranean, and another to Affganisthan.

Their leaves are employed for *Fans* or *Punkahs*, and the dried leaflets serve for writing on.

1. CORYPHA.

INFLORESCENCE terminal. SPATHES secondary and tertiary, as many as there are branches of the spadix. FLOWERS hermaphrodite, clustered several together. COROLLA three petalled. STAMENS hypogynous. BERRY almost juiceless. ALBUMEN either hollow in the middle or solid. EMBRYO near the apex. Large trees flowering only once. LEAVES fan-shaped, palmately divided.

2. LIVISTONA.

INFLORESCENCE axillary. FLOWERS hermaphrodite, clustered several together. COROLLA tripartite. STAMENS perigynous. FRUIT a drupe. ALBUMEN with a cavity communicating exteriorly, and filled with the integuments. EMBRYO about the middle of the dorsal face. Perennial trees. LEAVES fan-shaped, palmately divided.

3. CHAMÆROPS.

INFLORESCENCE axillary. FLOWERS polygamous, several together. COROLLA tripartite. STAMENS hypogynous. FRUIT a berry. SEED with a longitudinal furrow. Perennial shrubs or trees. LEAVES fan-shaped palmately divided.

4. LICUALA.

INFLORESCENCE axillary. FLOWERS hermaphrodite, solitary, or two or three together. COROLLA tripartite. STAMENS perigynous, filaments at the throat combined into an annulus. FRUIT as in LIVISTONA. Perennial shrubs. LEAVES fan-shaped, pinnately divided.

SECT. II. *Leaves Pinnate.*

SPADIX axillary, compressed, often exserted or projecting beyond the spathe, SPIKES fasciculate, often simple. SPATHE single, complete, coriaceous, with two keels, opening in three valves, the posterior being deciduous. INFLORESCENCE axillary. FLOWERS dioecious, MASCULINE (always having a rudimentary pistil) angular, CALYX 3-toothed. STAMENS hypogynous, often 6, sometimes 9, and seldom 3 in number. ANTHERS adnate. FEMININE

having 6 sterile stamens. CALYX as in the male, PETALS 3, round, fleshy, coriaceous, convolutely imbricated. OVARIES distinct. STYLES distinct, recurved. STIGMA sub-simple. BERRY often oblong, red, becoming blackish, ALBUMEN sometimes ruminated. EMBRYO central, or near the base.

Perennial, dwarf, stemless, shrubs or trees, often gregarious in dry arid places. TRUNK rough from the scars of fallen leaves. PETIOLES flattened or depressed below, above compressed and covered with copious fibrous flakes. PINNULES often fasciculate or in clusters, in several rows, rigid, shining, conduplicate or channelled, veins translucent parallel-striate, seldom solitary, in two rows, flaccid or flat; the lower surface spinous.

The palms composing this section, are inhabitants of the north western parts of Africa, and especially of the tropical parts of Asia, their northern limits being about the 30th degree of latitude.

The stems of some are rich in Sago, others in vinous juice, (Taree) and in Sugar. The fruit of some (PHŒNIX DACTYLIFERA) is highly esteemed in Persia and Arabia, as an article of food.

III. ARECINÆ.

LEAVES pinnately divided, seldom twice pinnate. INFLORESCENCE axillary, and terminal, centripetal, or centrifugal. FLOWERS monœcious, dicœcious or polygamous. SPATHES several, incomplete, or one or two complete, seldom none. STAMENS 3, or indefinite. PERIANTH Feminine flowers imbricately convolute, seldom with a valvate æstivation. OVARY 1 to 3-celled, 1 to 3 OVULES. FRUIT either a sort of berry or drupe, 3-celled or generally one-celled by abortion, deeply 3-lobbed. ALBUMEN horny, ruminate, even. EMBRYO *generally situated near the base.* Perennial, shrubby or arboreous palms, flowering but once.

SECT. I. *Leaves pinnately split, or pinnate. Spathes 1 or 2 complete. Female perianth, convolutely imbricated. Fruit often oblique.*

Elegant, shrubby or arboreous, often graceful and reed-like palms, flourishing in shady places. CROWN often large. LEAVES pinnately divided (some deeply bifurcate), or pinnate, LEAFLETS reflexed, often obliquely acuminate. INFLORESCENCE always centripetal, or partially centrifugal. SPADIX axillary, paniculately, or racemosely divided, rarely undivided, often broken, sometimes coloured. FLOWERS monœcious or polygamous, disposed in two rows. STAMENS 3, or indefinite. Feminine flowers often situated in pairs between two masculine. STIGMA sometimes three lobbed. FRUIT either slightly drupaceous and equilateral, or somewhat like berries, and obliquely formed.

These palms belong to the tropical parts of Asia, more especially the eastern Archipelago, the South Sea Islands, and India. The northern limit of Indian species is about the 27th or 28th degree.

USES, the albumen or kernel, is astringent, narcotic, and intoxicating, that of *Areca catechu* is (with quick-lime, and the bruised leaves of *Piperis Betel*) an essential ingredient in the well known masticatory, Indian Pan, for which this species is generally cultivated.

ARECA.

SPATHES 1-2 complete. FLOWERS monœcious in the same spadix; STAMENS 3, or indefinite. OVARY 1 to 3-celled, one seeded. FRUIT drupaceous, seldom an oblique-shaped berry. LEAVES pinnately divided, or pinnate.

BENTINCKIA.

SPATHES 2, inner one complete. FLOWERS monœcious, and placed in distinct spadices, their bases being immersed

or imbedded in depressions of the rachis. STAMENS 6, OVARIUM 3-celled, with one ovule. BERRY oblique. LEAVES pinnate.

SLACKIA.

SPATHES 2, incomplete, sheathing. FLOWERS monœcious in the same spadix, bases of the flowers imbedded in depressions of the rachis. STAMENS 6, filaments united at the base.

SECT. II. *Leaves pinnate, or bi-pinnate, divisions jagged. Inflorescence centrifugal. Spathes several, incomplete, imbricate, sheathing. Female corolla valvate.*

Perennial shrubby or arboreous palms. LEAVES pinnate, or bi-pinnate, furnished with a fibrous net wrapped round the base of the petioles; primary or secondary leaflets variously gnawed, linear, or often cuneate, often disposed in fascicles; beneath, often white. SPADIX either axillary or terminal, (at least in monœcious species,) evolution inverse. SPATHES many, imbricated, incomplete, covering the peduncle. SPIKES often pendulous, rising at the points.

FLOWERS monœcious (or sometimes polygamous) on the same, or distinct spadices, or dicœcious, masculine binate, with, or without an intermediate feminine flower. SEPALS 3, imbricated, PETALS three. STAMENS often indefinite. ANTHERS linear, adnate. COROLLA in the feminine valvate. OVARY 2 or 3-celled, with as many ovules. OVULES solitary. BERRY 1 to 3-seeded, ALBUMEN even, (in CARYOTA ruminated.)

They are inhabitants of woody mountains in tropical parts of the world, especially the eastern Archipelago. The northern limit of the Indian species being about the 27th or 28th degree, and within an elevation of 4,000 feet above the sea.

USES, the undivided trunks are emplo[illegible] when excavated, they are used as Aqueducts. When split, the outer tough parts of some are employed as poles for drawing water and the like, while the lighter tissue of the centre of others is rich in Sago. The fibres which clothe the petioles make superior Cordage, which is not injured by exposure to water or moisture. The Palm Wine, or juice which flows from the stem of others, is a refreshing and wholesome beverage when fresh, fermented and distilled, it affords Alcohol, and when evaporated, it affords Sugar.

SECT. III. *Flowers Monœcious on the same Spadix.*

CARYOTA.

LEAVES twice pinnate. STAMENS indefinite. OVARY 1 to 2-celled. BERRY 1 to 2-seeded. ALBUMEN ruminated.

SECT. IV. *Flowers Monœcious in different Spadices.*

ARENGA.

LEAVES pinnate, leaflets linear, once or twice auriculate at the base. STAMENS indefinite, OVARY three celled. Berry depressed, triangular, 3-seeded. ALBUMEN smooth.

HARINA.

LEAVES pinnate, leaflets wedge-shaped. FLOWERS sometimes dicœcious. STAMENS in some 6, OVARY. 2-celled. BERRY two-seeded. ALBUMEN smooth.

IV. NIPINÆ.

Rhizomatous. LEAVES Pinnate.

V. COCOCINÆ.

Interior spathe woody, complete; Feminine, corolla imbricated. DRUPE 1-seeded, putamen 3-porous. LEAVES pinnate.

VI. BORASSINÆ.

SPATHES incomplete, several; masculine, spadix amentaceous. Feminine, corolla imbricated. BERRY 3-seeded. Seeds pomaceous, their apex 1 porous. LEAVES palmate.

The following table exhibits the leading characters of the Order, in the connected form in which the several minor groups of which it is composed, are treated of in this work.

- **CALAMINÆ**
  - Ovary covered with scales or stiff hairs. Fruit scaly. Scales reversely imbricated. Spathes several, incomplete.
    - Section I.
      - Spikes round.
        - Zalacca...Flowers in pairs, seed berried, albumen hollowed out at the apex.
        - Sagus...Flowers in pairs, seed dry albumen ruminate.
      - Bracteoles woolly.
        - Calamosagus...Flowers solitary? Seed dry, albumen hollowed out at the apex and ruminate.
    - Section. II.
      - Spikes filiform.male only compressed. distichous. Bracteoles withoutwool: sexes almost always on different spikes. Flowers solitary.
        - Calamus.
          - Spadix an expanded panicle, rarely confined by boat-shaped spathes. Spathes not persistent. Fruit with smooth scales. Albumen pitted on the surface, or ruminate.
            - Calamus
              - *Sect.* 1. *Coleospathes.* Climbing or erect, spadix diffused, spathes persistent, tubulose, small, or incomplete.
              - *Sect.* 2. *Piptospathes.* Climbing. Petioles often whip-shaped, spathe 1, seldom 2, those of the branches deciduous.
              - *Sect.* 3. *Platyspathes.* Climbing. Petiole whip-shaped, spathe flat, the tube being small or obsolete.
              - *Sect.* 4. *Cymbospathes* or *Demonorops.* Climbing or erect. Petiole whip-shaped, spadix contracted, spathe boat-shaped.
        - Plectocomia..Spadix with tail-shaped pendulous branches. Spathes persistent, concealing the flowers. [Fruit hispid.
        - Eugeissona . Flowers terminal with many imbricated bractes. Stamens indefinite. Albumen 6 grooved.
        - Ceratolobus. Spathe one, complete.
- **CORYPHINÆ**
  - Flowers hermaphrodite, seldom polygamous, rarely dicœcious. Ovaries three, distinct or partly cohering. Fruit generally solitary, one ovary only being matured, 1-seeded. Albumen equal, solid, or hollow in the centre, or excavated on the surface. Embryo dorsal.
    - Section I.
      - Leaves Fan-shaped
        - Palmately divided
          - Corypha... Large trees, flowering only once. Inflorescence terminal; secondary and tertiary spathes many. Flowers hermaphrodite, several together Corolla three petalled. Stamens hypogynous. Berry almost dry. Albumen hollow in the middle, or solid. Embryo near the apex.
          - Livistona.. Perennial trees. Inflorescence axillary. Flowers hermaphrodite several together. Corolla three-parted. Stamens perigynous; Fruit drupaceous. Albumen with a cavity communicating exteriorly and filledwith the integuments. Embryo about the middle of the dorsal face.
          - Chamærops Perennial. Inflorescence axillary. Flowers polygamous, several together. Corolla three parted. Stamens hypogynous. Fruit a berry, seed with a longitudinal furrow.
        - Pinnately divided...
          - Licuala.... Perennial. Inflorescence axillary. Flowers hermaphrodite, solitary, two or three together. Corolla three parted. Stamens perigynous; filaments at the throat combined into an annulus. Fruit as in Livistona.
    - Section II..... Leaves Pinnate, ... Phœnix..... Perennial trees and shrubs.
- **ARECINÆ**
  - Flowers mono-dicœcious, or polygamous. Spathes several incomplete, rarely none. Stamens three, or indefinite, hypogynous Female perianth convolute imbricate, rarely valvate. Ovary, one or three-celled. Fruit generally by abortion one-celled. Albumen ruminate or equal. Embryo generally basilar.
    - Section I.
      - Spathes one, or two, generally complete. Female perianth convolute imbricate. Fruit often oblique.
        - Areca. .... Spathes one or two complete. Flowers monœcious on the same spadix. Stamens either three or indefinite Ovarium one to three celled. Fruit drupaceous, in some an oblique berry. Leaves pinnately split, or pinnate.
        - Bentinckia Spathes two, inner one complete. Flowers monœcious on distinct spadices, their bases immersed in niches. Stamens, six, Ovarium three celled. Fruit a Berry? exceedingly oblique. Albumen solid. Leaves pinnate.
        - Slackia... Spathes, two, incomplete, sheathing. Flowers monœcious on the same spadix, their bases immersed in niches. Stamens six, filaments united at the base. Ovarium three celled. Fruit drupaceous exceedingly oblique Albumen ruminate. Leaves pinnately split.
    - Section II....
      - Inflorescence centrifugal, spathes several, incomplete Female corolla valvate.
        - Caryota.. Leaves bi-pinnate. Flowers monœcious on this same spadix. Stamens indefinite. Ovarium one or two celled. Berry one or two seeded. Albumen ruminate.
        - Arenga.... Leaves pinnate; leaflets linear, one or two auriculate at the base. Flowers monœcious on different spadices or dicœcious. Stamens indefinite. Ovarium three celled. Berry with a depressed triangular apex; three seeded, albumen equal.
        - Harina. ... Leaves pinnate; leaflets cuneate. Flowers sometimes dicœcious. Stamens sometimes six. Ovarium two celled. Berry two seeded. Albumen equal.

I. ZALACCA.

Rumph. Hb. Amboin. 5. *p.* 115. *t.* 57. *f.* 2. *Reinwdt. Blume in Syst. Veget. ed Schultes* 7. *pt.* 2. *p.* 1333. *Wall. Pl. Asiat. Rar.* 3. *t.* 222—224. *Martius Palmae. p.* 200. *t.* 118. 119. 123. 136. *et* 159. *f.* 2. *Endl. Gen. Pl. p.* 249. *No.* 1737. *Calamus Zalacca. Gært.* 2. *p.* 267. *t.* 139.

GENERIC CHARACTERS.

SPIKES terate, amentaceous. FLOWERS imbedded between two paleaceous velvety bracts, MASCULINE in pairs, FEMININE solitary, or situated along with a neuter flower. STAMENS 6. OVARY covered with scales reversely imbricated. FRUIT one to three-seeded. SEEDS baccate or like berries. ALBUMEN excavated at the apex. EMBRYO situated at the base.

HABIT. Spreading almost stemless leafy palms, without the whip-like elongations of the petioles, the PETIOLE together with its SHEATH, are both armed with several series of rigid spines. LEAFLETS often disposed in tufts, and placed at various angles with the midrib, apex of some nodding, of some straight, both regularly alternate. SPATHES incomplete, scarious, striate, variously split and torn. SPADIX either simple or branched. SPIKES sessile, and nearly enclosed by the spathes, or they are pedicellate and protruding from beneath the spathe. BRACTEOLES united into cup-shaped depressions forming partitions between an imperfectly ternate disposition of the flowers. FLOWERS either dicœcious or polygamo-moncœcious. FRUIT often scaly, apex elongated, cleft, or rough.

OBSERVATION. The Genus is allied to that of *Sagus*, but differs from it in habit, (except *Z. conferta*) in the berried form of the seed, and in the albumen being excavated at the apex. To the Genus *Calamus*, these Palms approach in various ways.

They may be conveniently subdivided into two Artificial Sections.

FIRST SECTION. *Diœcious. Feminine flowers solitary.*

Zalacca edulis, Reinwdt.
,, *affinis*, Griffith.
,, *secunda*, id.

SECOND SECTION. *Polygamo-monœcious, or Diœcious. Feminine flower placed along with the neuter.*

Zalacca macrostachya, Griffith.
,, *glabrescens*, id.
,, *conferta*, id.

1. ZALACCA EDULIS.

TAB. CLXXV.

Petiolis infra medium pinniferis, spinis robustis (fuscescentibus), pinnis fasciculato-interruptis setoso-acuminatis margine spinuloso-setosis, spadicibus masculis nutantibus ramosis, ramis elongatis alternatim spiciferis, spicis sessilibus saepius distantibus quam spathæ fere duplo brevioribus, fructibus hispidis obovato-pyriformibus vel ovato-cuspidatis.

Zalacca edulis, Reinwdt. Syst. Veget ed Schultes 7 *pt.* 2 *p.* 1334. *Zalacca Rumphii*, Wall. *Pl. Asiat. Rar. p.* 14. *Zalacca Wallichana*, Mart. Palm *p.* 201. *t.* 118, 119, 136.* *Calamus Zalacca*, Roxb. *Fl. Ind.* 3 *p.* 773.

This is a tufted short stemmed palm. *Leaves* varying in size; in marshy shady places being 18 or 20 feet in length, in dryer places, not exceeding 10 or 12 feet. *Petiole*, for five or six feet from the base, only bearing spines, which are large, and generally palmate; the spines of the upper or leaf-bearing part, are often solitary. *Pinnules* or leaflets interruptedly fasciculate, they are first ascending, then curved downwards, oblong-spathulate, lanceolate, and tapered into a long subulate bristle, they are 3-keeled above, the margins furnished at intervals with short bristles. The length of the largest leaflet is 16 or 18 inches, breadth 4 or 5 inches.

Spadices axillary, about 2 feet long, nodding, branched, covered with scarious, split, and lacerated spathes. Each branch, and each spike suffulted by a spathe; the main ones being longer than the branches, the partial, shorter than the spikes which are about two inches long. *Bracts* rounded, short striate. *Bracteoles* densely villous.

Flowers (male) of pink colour. *Calyx* three-parted below the middle. Segments of the *corolla* oblong, mucronate, spreading.

Filaments white adnate to the corolla, as high up as the sinuses of its segments, then free, short, and stout. *Anthers* attached near the middle. Rudimentary anthers of the *female*, consist of three oblong processes.

Female flowers were not seen. *Fruit*, which is generally sparingly produced, sessile, sub-ovate, with a stout conical apex, and of a reddish brown colour. The *spadix* in fruit is very ragged from the remains of the spathes, and if many fruits are developed, is decidedly nodding or drooping. *Seeds* three, or by abortion two or even one. The shape varies with their number. Their covering or coat is baccate, and consists externally of a thin membrane, which belongs to the fruit. *Albumen* horny, with a pit at the apex, the surface is wrinkled, and brownish-red from adhering tissue: on one of the sides is a round umbilicus, to which the terminal cavity or pit will be found to point. *Embryo* basilar, the apex of the cotyledon reaching nearly to the lower part of the terminal cavity.

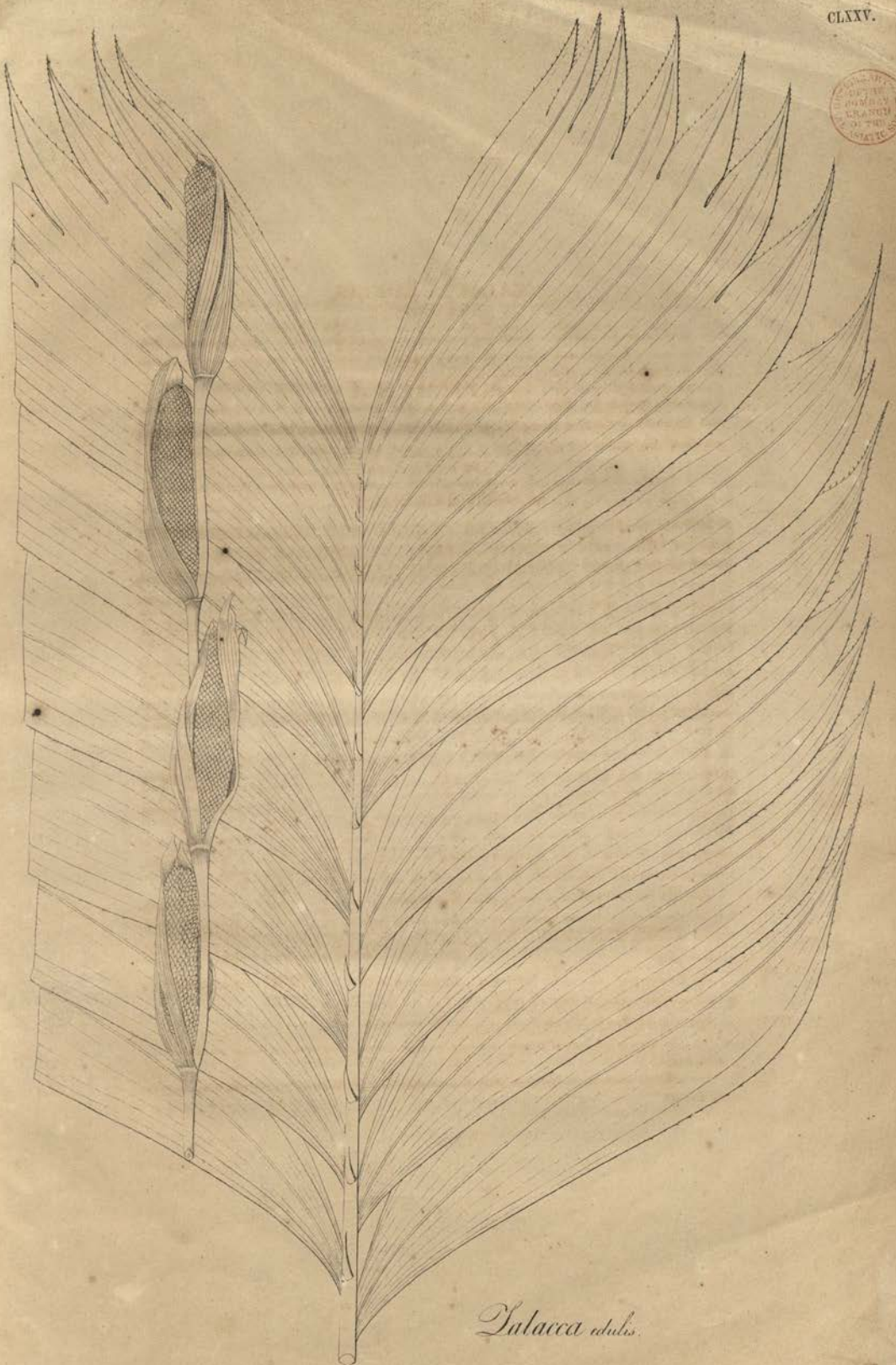
HAB. This species is common in swampy places about Malacca, the Tenasserim Provinces, as well as in Burmah. It is the *Salac-koombar* of Penang, according to specimens kindly presented to me by Mr. W. T. Lewis, Assistant Resident Councillor of that settlement. Male specimens of this species exist in the Botanic Garden Calcutta, but no female plants.

The Malacca plant will probably be found to be different from *Z. edulis*, when sufficient attention has been paid to the female inflorescence, the shape and surface of the fruit, and the structure of the seed.†

Supposing that there be only one species, three varieties would appear to be presented as follows.

* Gaetner's figure as well as that of Rumphius cited under the generic character, belong according to Professor Von Martius (Palmæ p. 202) to *Blumeana*.

† It is doubtful whether the direction of the pit at the apex does not depend upon the shape of the seed, which is due again to the number developed.



Salacca edulis.

VAR. α. Spadices very long and attenuated almost into a flagellus; lower spathes large, imbricated, in two rows. Branches of the spadix a good deal divided, their spikes or aments alternately approximate, but are not confluent; their spathes are about equal in length to their aments.

VAR. β. *Koombar* of Penang. Spikes (male) distant, half enclosed in ventricose spathes, equalling them in length.

VAR. γ. Spadices (male) a good deal elongated without being attenuated, much branched, sometimes distant, sometimes crowded, occasionally assuming the form of VAR. β; sometimes proliferous at the apex. The lower spathes of moderate size, spikes or aments twice as short as their spathes.

Z. *Wallichana* of the H. C. Botanic Garden.

2. ZALACCA AFFINIS.

TABS. CLXXVI. A.B.C.

Petiolis a medio supra pinniferis, spinis longis gracilibus albis, pinnis interrupte fasciculatis spathulato-lanceolatis acuminatis apicem versus e margine setigeris, spadice masculo inferne ramoso spathis distichis imbricato, ramis abbreviatis quam spathæ brevioribus, spicis ramorum congestis, distichis fructibus ovatis mamillato-cuspidatis (glabris.)

The description of this species is derived from specimens of two entire leaves, a male spadix, part of a female spadix in flower, and two fruits obtained from my collector Emanuel Fernandez.

The *Leaves* are altogether smaller, and the stalk more slender than those of any of the other species; their length is twelve or thirteen feet; the pinnules being confined to the upper half or there abouts, of the stalk.

Spines very long, comparatively slender, and disposed in irregular, incompletely transverse sets, the longer spines deflexed, the others spreading in various directions; those of the pinniferous portion solitary and somewhat deflexed.

Pinnæ or leaflets interrupted, sub-ascending, otherwise with the ordinary direction; those of each fasciculus rather crowded, often almost opposite, outline decidedly falcate, spathulato-lanceolate, acuminate,* scarcely cirrhose, the acumination having few setæ, the upper surface presenting three stout prominent veins, the under about twelve, all much less prominent than those of the upper surface.

The male *Spadix* appears to be about one and half feet in length; it is imbricated, with the usual scariose, mealy, variously split and lacerated spathes; the general form being subulate. The lower axes of inflorescence are branched, those above the middle simple.

Spikes generally under an inch in length, (those of the branches crowded together) with about twelve rows of small flowers disposed in pairs, their lower halves immersed in the tomentum of the spikes.

Bracts rather roundly cordate, membranous, distinct, comparatively small.

Flowers two to each bract, both male, separated from each other by a membranous perpendicular partition (part of the bracteoles) penicillate at the apex. A narrower, conduplicate, equally penicillate one on the outer side of each flower.†

Calyx three-parted nearly to the middle, segments oblong, concave.

Corolla attenuate at the base, three-parted below the middle, segments oblong-lanceolate, acute. *Stamens* six, united to the corolla, and (to each other) at the base of the segments.

Filaments free, very short, subulate. *Anthers* oblong. A rudimentary *Pistil* occurs.

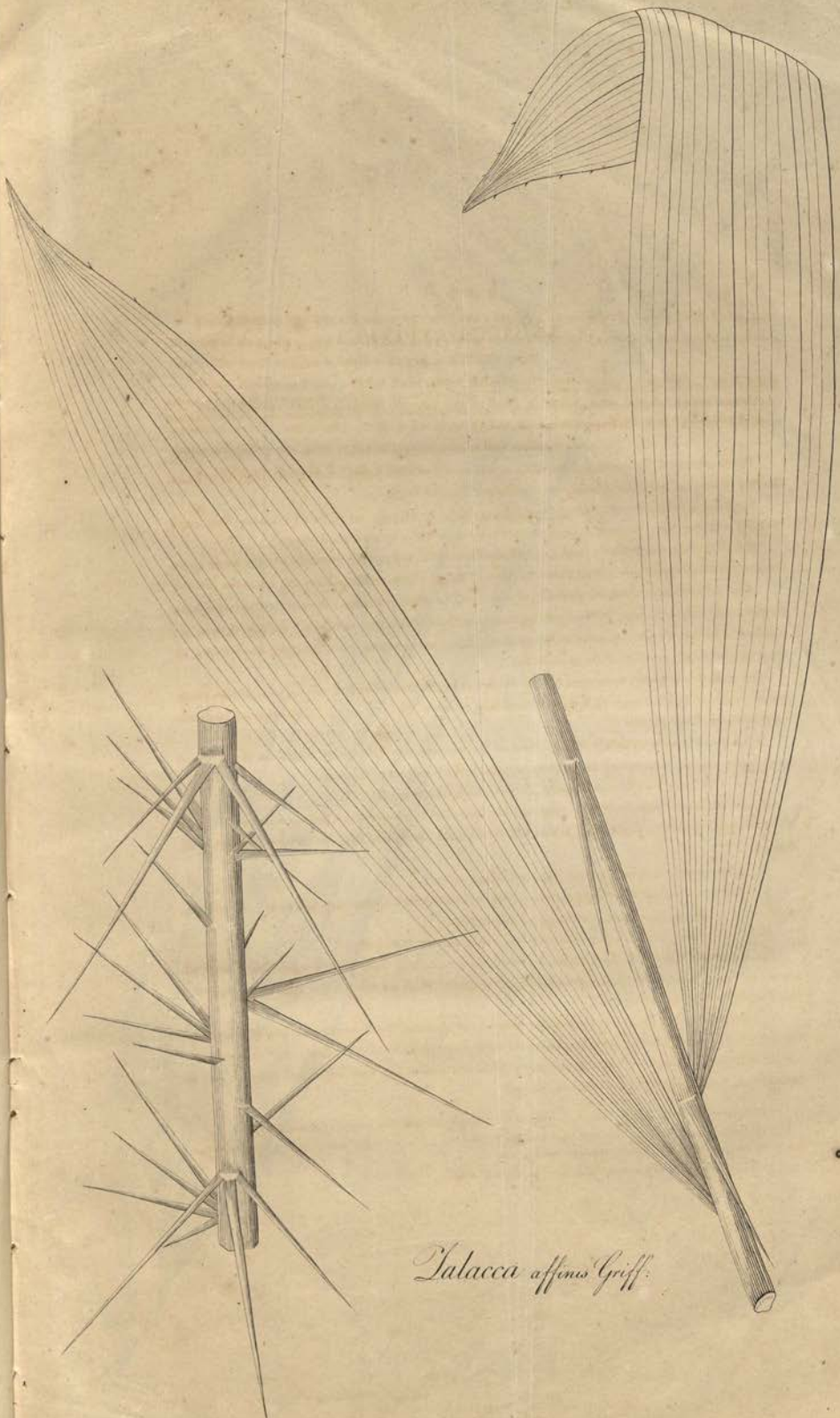
The female *spadix* (in the specimen examined) is about three inches long, suffulted by a much longer lacerated spathe, and is also to a considerable degree covered by the spathelles, which are much longer than their respective spikes, much imbricated, and lacerated.

The lowermost *spikes* appear to be three or four-flowered, the uppermost, one-flowered: at the base of each within the spathelle, is a broad close-clasping bract. And round the base of each flower is also a deeper more concave *bract*, and two *bracteoles*, the margins of which are posteriorly united into a short cup, with very villous margins: part of them distinct, forming a partition and much less villous.‡

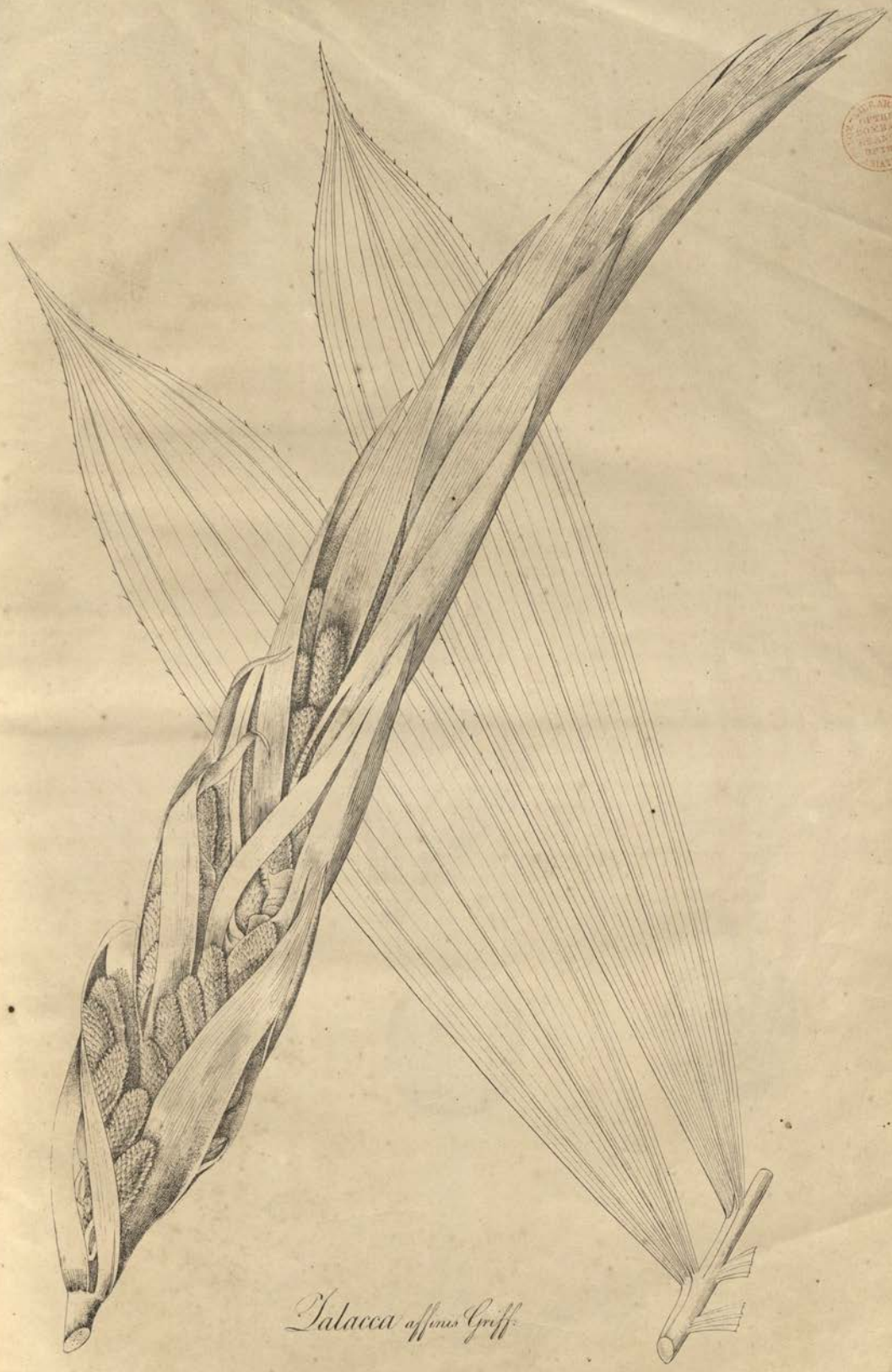
* The uppermost are not uncommonly incised at the apex, when both margins bear setæ. This is also the case with *Z. edulis*

† The bracteoles in this also appear to be originally united into a two-celled cup in one of the cells of which a flower exists, the arrangement described appears to be the result of pressure and distention.

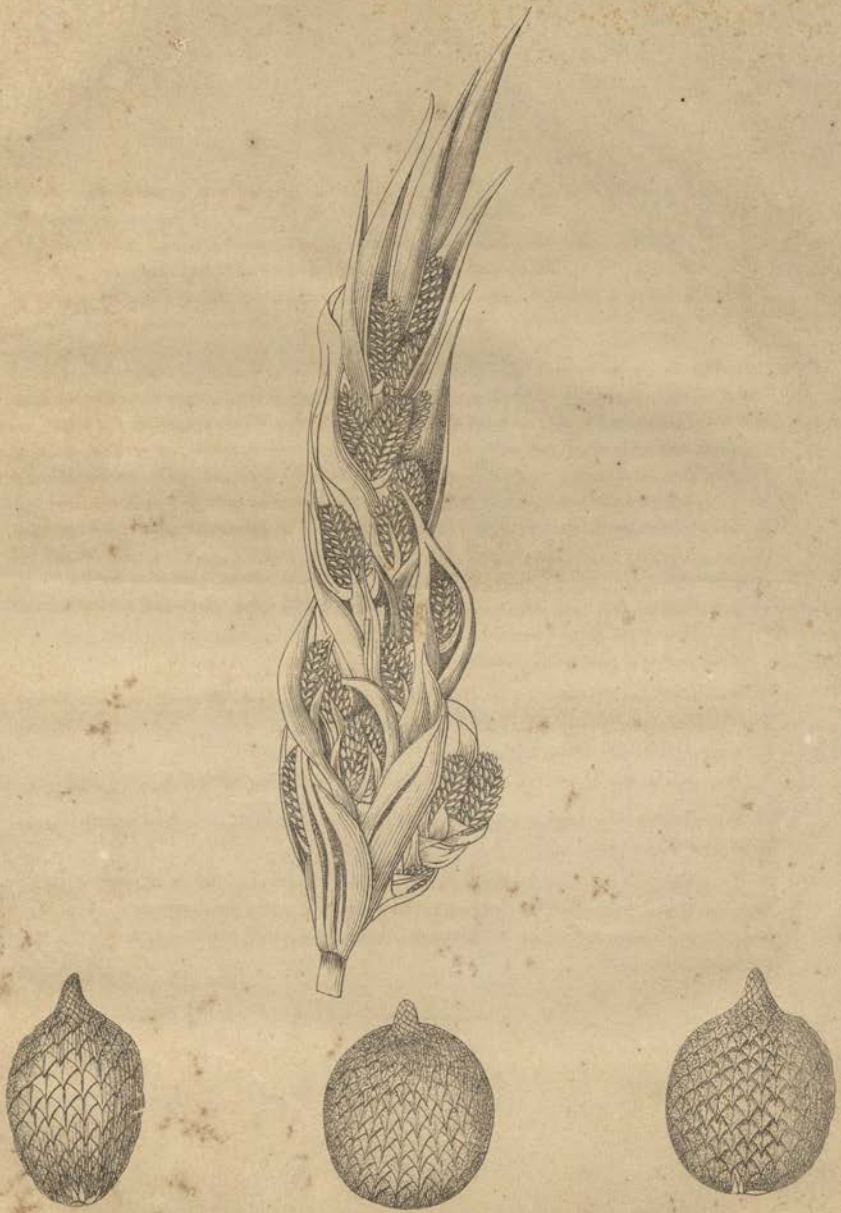
‡ But these parts seem to vary much, as also the length of calyx in *Z. edulis*.



Salacca affinis Griff.



Salacca affinis Griff.



Salacca affinis Griff.

Flowers large, solitary, in the bud ovate, with a hard thorny point. *Calyx* (of the bud) almost ovate, three-toothed afterwards split irregularly.

Corolla a little longer than the *calyx*, three-parted to the middle, segments very pointed and pungent.

Sterile stamens six, adnate to the corolla as high as the sinuses of the segments.

Ovary oblong, with retrorse scales; parietes thick, succulent, 3-celled. *Ovules* solitary, erect, anatropous. *Style* short. *Stigmas* 3, connivent into a cone.

Fruit ovate, two and half inches long, one and three-quarters broad, perhaps somewhat compressed, surrounded at the base by the corolla variously flattened out and split, apex distinctly mamillate-cuspidate; the scales very many, more highly imbricated than ordinarily, more pointed, furrowed along the centre, of rich chesnut colour, browner towards the margin; towards the base, or where they become recurved on either side, they present a more prominent convexity than usual. (The pulp destroyed by insects.)

Seeds one to three, small in comparison with size of the fruit, being about nine lines long, seven broad, and five in thickness, oblong, plano-convex, umbilicate at the apex, black on the surface, without any lateral umbilicus, cavity or pit, vertical.

HAB. Found by Emanuel Fernandez an intelligent Portuguese, at Malacca near Ching, where it is known under the name of *Salak Batool*; which means the true *Salak*.

3. ZALACCA SECUNDA.*

TAB. CLXXVII.

Petiolis—, spinis—, pinis—, spadicibus masculis subnutantibus spathis undique vestitis, spicis pedicellatis exsertis secundis, pedicellis spathis vaginantibus imbricatis, bracteis (spicarum) distinctis supremis et infimis vacuis.

The specimens from which this description has been drawn up, consist of male spadices before the opening of the flowers, and a spadix without flowers from the Mishmee mountains. This last has the spikes slender, often more exserted, and the villosity more developed.

Spadices about two feet long, slightly curved, closely imbricated with the scarious, striated, split spathes.

Spikes stalked, exserted; stalks nearly as long as the spathes, also covered with imbricated spathes, the uppermost of which resemble those of the flowers, except in not producing any villosity. The spikes themselves are two and a half, and three inches long, and scarcely half an inch in diameter, the bracts both of the apex and base, appearing to be empty.

Bracts rounded, distinct, and presenting on the outer side of each flower, a tuft of hair.

Flowers densely crowded, so that their disposition is not at first apparent, the buds depressed at the apex.

Calyx tripartite to about the middle, scarious, and striate, segments oblong, concave.

Corolla (not seen in an expanded state) about the length of the *calyx*, divided not quite to the middle, the segments being oblong, and concave.

Stamens united to the petals as high as the base of the segments. *Filaments* (free) obsolete. *Anthers* oblong.

I have no information regarding the leaves, but the habit of this species was noted to be that of *Z. edulis*.

HAB.—In forests about Kujoo, in Upper Assam. The Mishmee mountains, and on the lower ranges of hills on the borders of Upper Assam.

This species in the character of the stalked spikes, approaches to *Z. Blumeana*, Martius. Dr. Martius however states, that his plant has the spadix alternately and distichously branched, that the pedicels are from one to two inches long, furnished at the base with a *spathe*. The flowers also are described as scarcely exserted, and the bracts as confluent at the base.

* Placed here provisionally.

Salacca Secunda Griff.

4. ZALACCA MACROSTACHYA,

TABS. CLXXVIII. A.B.C.

Pinnis interrupte fasciculatis (fasciculis distantibus) lanceolato-spathulatis acuminatis-simis infra medium setoso-serratis, spadicibus elongatis apice nutante humifusis, spathis distantibus, spicis (fœmineo-neutris) pedicellatis, ovario strigosissimo, fructibus irregulariter oblongo-ovatis cuspidato-rotratis hispidis.

This palm resembles *Z. edulis*, like which it assumes a tufted form, but is however, a stouter species.

Petioles or leaf-stalks lengthy, strong, and without any leaflets for seven or eight feet above the base, but more highly armed than *Z. edulis*, with the characteristic spines of the genus, the larger of which are in oblique, and nearly complete verticils encircling the petiole.

Pinnæ or leaflets more interruptedly fasciculate or clustered than in *Z. edulis*, their direction always curved downwards or nodding, the shape being much the same as in that species, but on the whole perhaps they are larger.

Spadices very long, so much so in fact as to reach the ground, on which the spikes of flowers are frequently to be found, and often immersed in water, which abounds in the favourite localities of this species.

Peduncles in those parts which are not covered by the spathes, are clothed with a thick brown wool.

Spathes of the usual nature, but much more distant; they are generally longer (except the lowermost) than the solitary aments.

Spikes three inches long, and an inch nearly in diameter, stalked; the stalks of the lowermost very long, and all provided with smaller spathes. *Bracts* rounded, tinged with pink colour. *Bracteoles*, at least of the hermaphrodite flower, rounded, distinct, villoso-ciliate.

Flowers of a lilac-pink colour; one large female flower is placed in the axil of each bract, and by the side of this, is a much smaller neuter flower.

Calyx of the larger flower three-parted, the divisions extending down to the middle of the segments, which are oblong, concave, and not very rigid.

Petals united to their middle, (below which they are white), oblong, erect or nearly so, very rigid and almost siliceous.

Stamens effete or sterile, the filaments united to the corolla high up.

Ovary oblong, very strigose with subulate erect hairs, and towards the base it is covered with pointed fleshy scales, 3-celled, substance thick and fleshy.

Ovules, one in each cell, erect, anatropous.

Style short, three-parted the division extending down to the middle, branches irregularly ob-cuneate or in other words, reversely wedge-shaped; the stigmatic surfaces are of blood-red colour.

The smaller, or neuter flowers, appear to be irregular in situation, and not unfrequently wanting, and present the rudiment of a pistil, and the stamens are reduced almost to the filaments, those opposite the petals, are much larger than the others.

Fruit obliquely oblong-ovate, attenuated into a point, three inches long, one and a quarter inch in diameter, covered with scales, presenting hispid or rough recurved points. *Pulp* white, more spongy than that of *Z. edulis*.

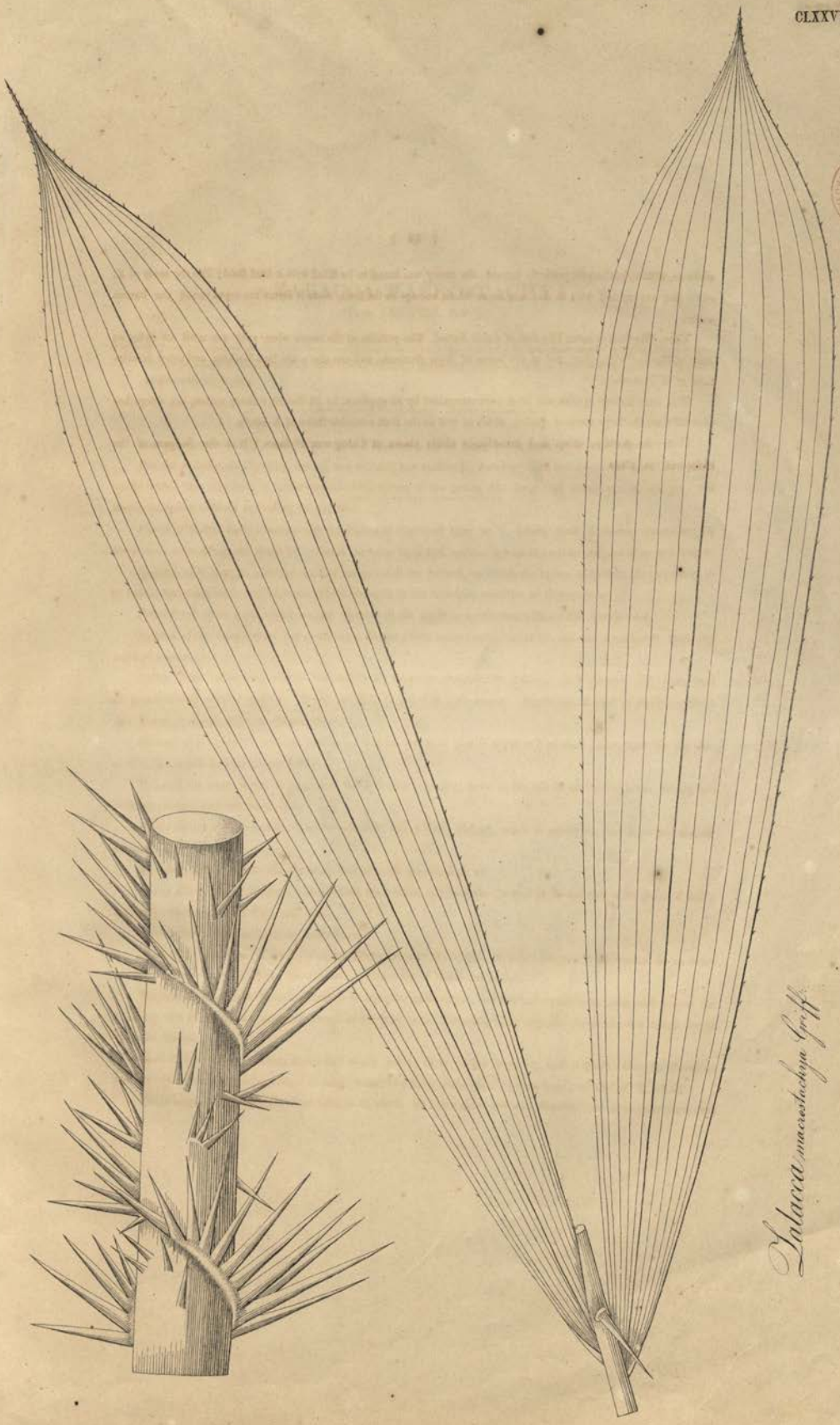
Seeds large, more deeply furrowed than in *Z. edulis*: all those examined were abortive, not even presenting any

albumen, although otherwise perfectly formed: the cavity was found to be filled with a fetid fluid; like the seeds of *Z. edulis* they are covered with a fine membrane which belongs to the fruit, since it forms the septa round the barren ovules.

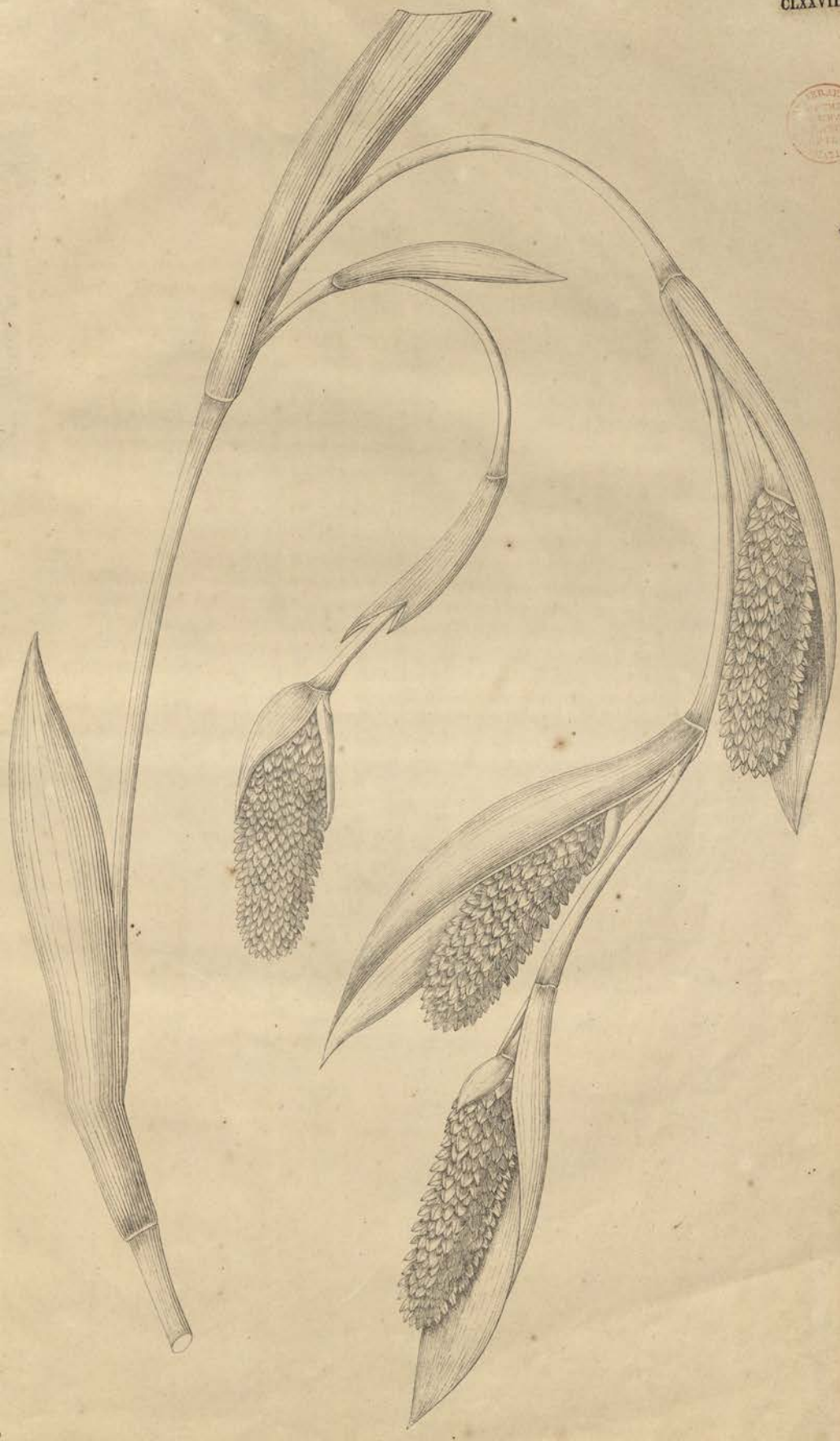
Uses. The fruit is eaten like that of *Salak Batool*. The petioles of the leaves when split are used for tying on *Atap* or House-thatch, composed of the leaves of *Nipa fruticans*, and are also made into Baskets, and other descriptions of Wicker-work.

This very distinct species will be at once recognised by its spadices, by its distant solitary spikes, not altogether exserted from the large scarious spathes, which as well as the fruit resemble those of *Z. edulis*.

Hab.—In marshy, damp and exceedingly shady places, at Ching near Malacca. It is the *Rungum* of the Malays of that place.



Salacca macrostachya Griff.



Salacca macrostachya Griff.

5. ZALACCA GLABRESCENS.

TAB. CLXXIX.

Pinnis continuis anguste-lanceolatis cirrhoso-acuminatis, spadice ramosissimo, spicis secundis (masculis et fœmineo-neutris) longe pedicellatis, bracteis latissimis undulatis villum parcum obtegentibus, ovario strigosissimo.

This is another species for which we are indebted to the kindness of Mr. Lewis, who forwarded to me portions of a leaf and spadix in flower, under the name *Salak*.

Petioles slender, trigonal below the leaflets, with an appearance of having been armed with a simple, even row of spines on either face. The uppermost spines of the under face are slightly curved upwards, short and stout on the upper triangular part, lower down, is a row of larger solitary spines.

Leaflets not interrupted, narrow, lanceolate, from twenty to twenty-two inches long, by two and a half broad, cirrhose-acuminate, margins towards the apex with a few setigerous teeth, veins as in *Z. edulis*; the terminal part of the leaf bilobed, each lobe deeply four and five cleft.

Spadices much branched, each branch bearing a spike; generally with one terminal spike. The young *spikes* or aments slender, owing to the broad shallow bracts looking as though they were annulate. Mature *female-neuter* ones stout, three or four inches long, with an obvious spiral arrangement. The spadices are less covered than in most of the other species by the primary spathes, the branches are entirely covered with loosely sheathing spathes.

Bracts of the apex, (which is attenuate cuspidate), and base, empty, broad, margins undulate. *Bracteoles* and *septum* large, shortly woolly at the points. No wool visible externally.

Male spikes cylindrical, about the same length, but much smaller in diameter, wool very little developed. *Bracteoles* obsolete or nearly so.

Male flowers in pairs, both of equal size, projecting very little beyond the bracts. *Calyx* three-toothed, teeth rounded. *Corolla* three-parted nearly to the middle, tapering below, (a considerable part of this taper portion is torus, or rather internode), segments broadish, oblong.

Stamens united to the corolla as far as the base of the segment. *Filaments* (free) short. *Anthers* oblong. No rudiment of a *Pistil*. *Flowers* of female-neuter spikes in pairs, one large, and one small. Smaller flower neuter, longer and larger than the male flowers, and more oblique, but otherwise much the same. *Barren stamens* six, united high up to the petals, filaments (free) of middling length, subulate. *Anthers* small, sterile. Whithin the attenuate base, an ordinary rudiment of the female.

Female flowers large, also oblique.

Calyx not quite divided to the middle, scarious, very striate, segments oblong obtuse. *Corolla* (expanded not seen), a little longer than the calyx, three-parted nearly to the middle, segments broad ovate.

Barren stamens six, much like those of the neuter flowers.

Ovary very densely strigose with erect stout hairs,* (of which the lower are the shorter), ovate conical, with a stout neck similarly covered with hairs, 3-celled. *Ovule* solitary, erect, anatropous. *Style* stout, thicker than the neck of the ovary, three-parted, segments lanceolate, stigmatose inside.

Obs. This species, would appear to approach *Z. secunda*, in the branching of the spadix. It is the only species I am acquainted with, in which the wool of the bracteoles is so little developed as not to be visible externally. The spikes consequently have a smooth aspect.

Hab.—Penang where it is called *Salak*.

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* These hairs are flattened and a little dilated at the base, upwards they become subulate, and have a fibrous appearance.

Salacca globiscens Griff.

6. ZALACCA CONFERTA.

TABS. CLXXX. A.B.C.

Pinnis lineari-ensiformibus strictis margine setoso-spinescentibus, spicis (masculis vel fœmineo-neutris) confertis, fructibus (confertis) turbinatis glaberrimis.

This is a stout, and less tufted palm than any of the others I have seen, generally forming wherever it occurs, an impenetrable jungle.

The *petioles* are sometimes 18 or 20 feet long, and without leaflets for about half their length, they are stout, rather round on the lower surface, but flattened above, and armed (except on upper flat part) with white slender spines, disposed in a fasciculate manner.

The *leaflets* are regularly alternate, quite straight, almost ensiform, two feet long, by two and a half inches broad, rigid, three-carinate or veined, above subulate, apex acuminate, margins and apex both very bristly; the upper leaflets or pinnules, have bristles also on the three primary veins or carinæ, of the upper surface.

The *spadices* are about a span long, sometimes a foot long, crowded with cylindrical *spikes* about six inches long, and seven or eight lines broad, among which occur, *spathes* of the ordinary structure, but more lanceolate than usual. The *spikes* are polygamous on different individuals.

Male flowers in pairs, accompanied with the usual bracts, and bracteoles, the latter being exceedingly villous, and connate, or which means the same thing united at their base into a sort of bi-locular cup.

The *calyx* is composed of three oblong sepals, distinct nearly from the base.

The *corolla* also is composed of three petals, hard, and almost woody, about twice as long as the calyx.

The *stamens* are 6 in number, united below to the corolla, *filaments* short, robust, sanguineous; *anthers* oblong-ovate, and large. Rudimentary *pistil* not observed.

Female-neuter, spikes more lengthened, the bracts more acuminate, each of these suffults or supports, two flowers, the smaller one neuter, generally alternating in each series, the other larger, female. The *sepals* are oblong and roundish. The *corolla* three-parted below the middle, segments acuminate. Rudiments of six subulate *stamens*.

The *ovary*, with the style, inversely turbinate, scaly, three-celled. The *ovule* solitary. The *style* stout, with three acute, recurved branches, the inner surfaces of which are transversely lamellar.

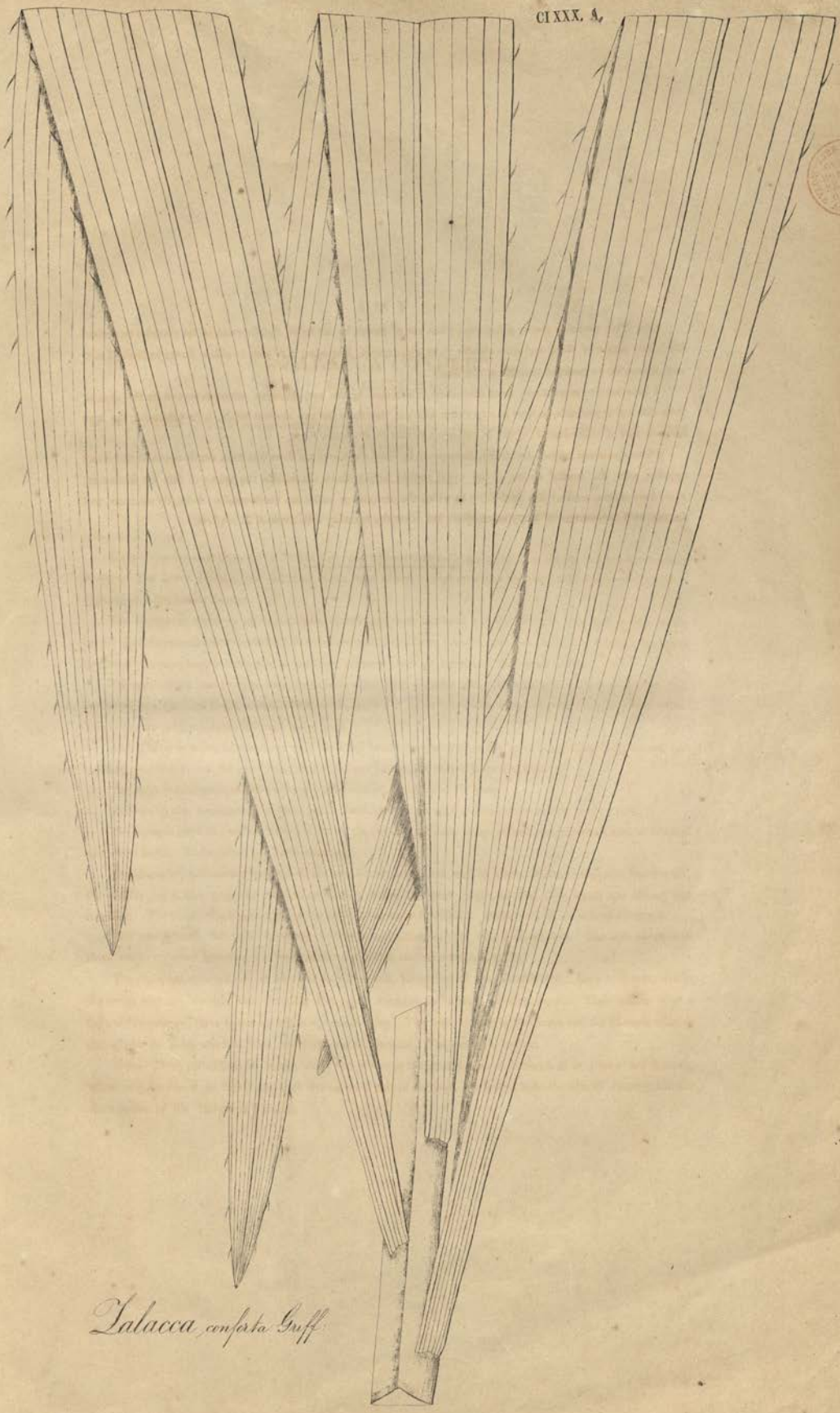
The *fruits* are crowded into an irregular formless mass, sometimes of considerable size. Each fruit is turbinate, the scales perfectly smooth, with irregular denticulate margins, and a waxy shining aspect. Their colour is of a light tawny-greenish tint: mesocarp white, spongy-cellular. The *seed* is broadly turbinate, and the *albumen* adheres strongly to the pulp, which is thick, and very sour to the taste. The *embryo* is basilar.

HAB.—These palms flourish in very shady wet places in the great forests of Malacca, as at Ching and Katawn, where they are found in flower and fruit during most part of the year. It is the *Asam-Koomber* of Penang, and the *Asam-paiah* of the Malays of Malacca.

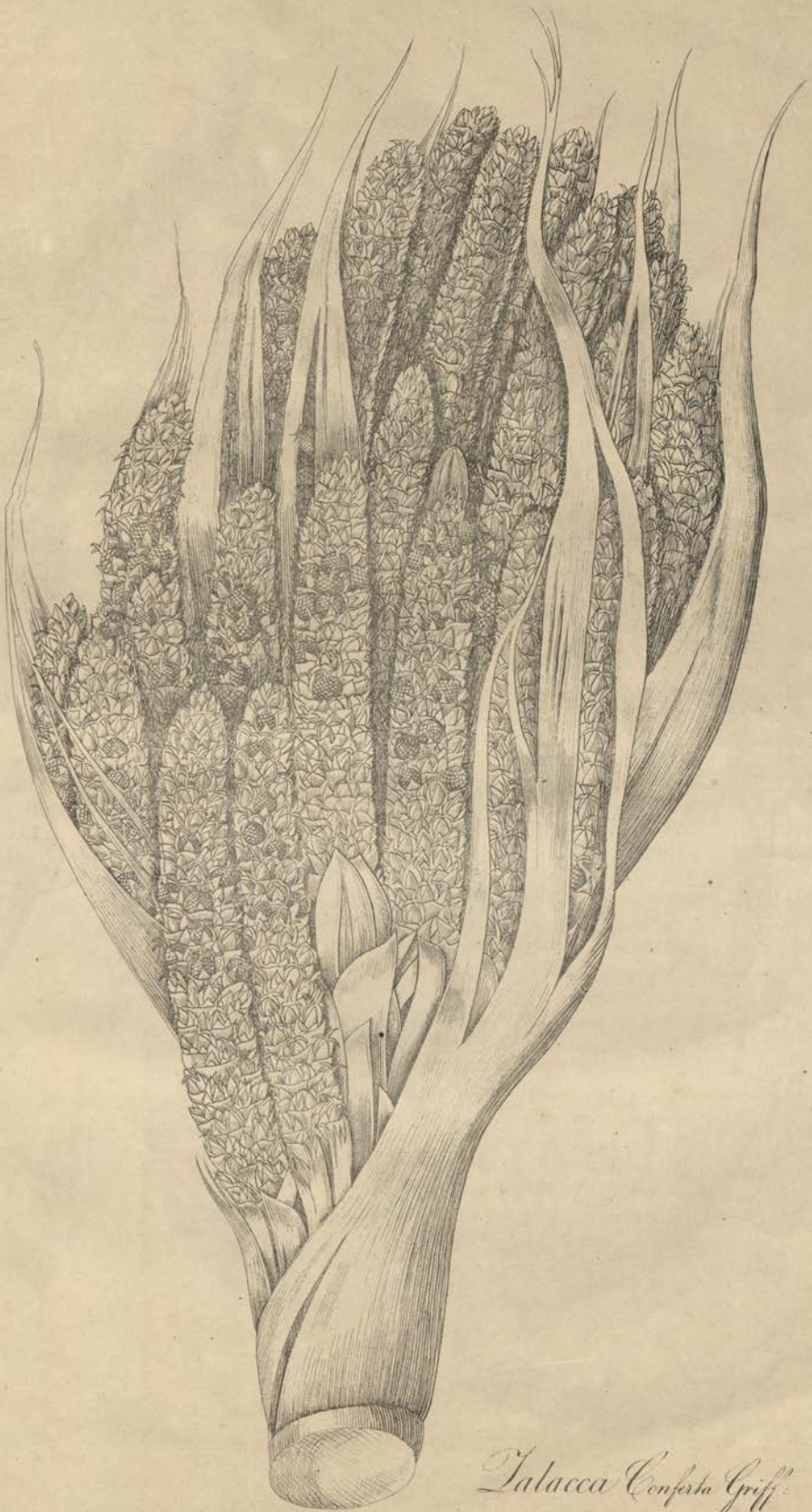
Obs. This species is distinguished even when out of flower, by its habit, the direction of its pinnules or leaflets, the bristly carinæ of these, and their slender short white spines. But when it is seen in either flower or fruit, it is at once known by its crowded thyrsiform spadices.

I have not yet ascertained, what distinction is indicated by the two Malayan names bestowed on this species, from which it is probable, at least so experience tells me, that there are two distinct kinds, both presenting the same unusual sort of inflorescence, which is analogous to that of the genus *Elais*.

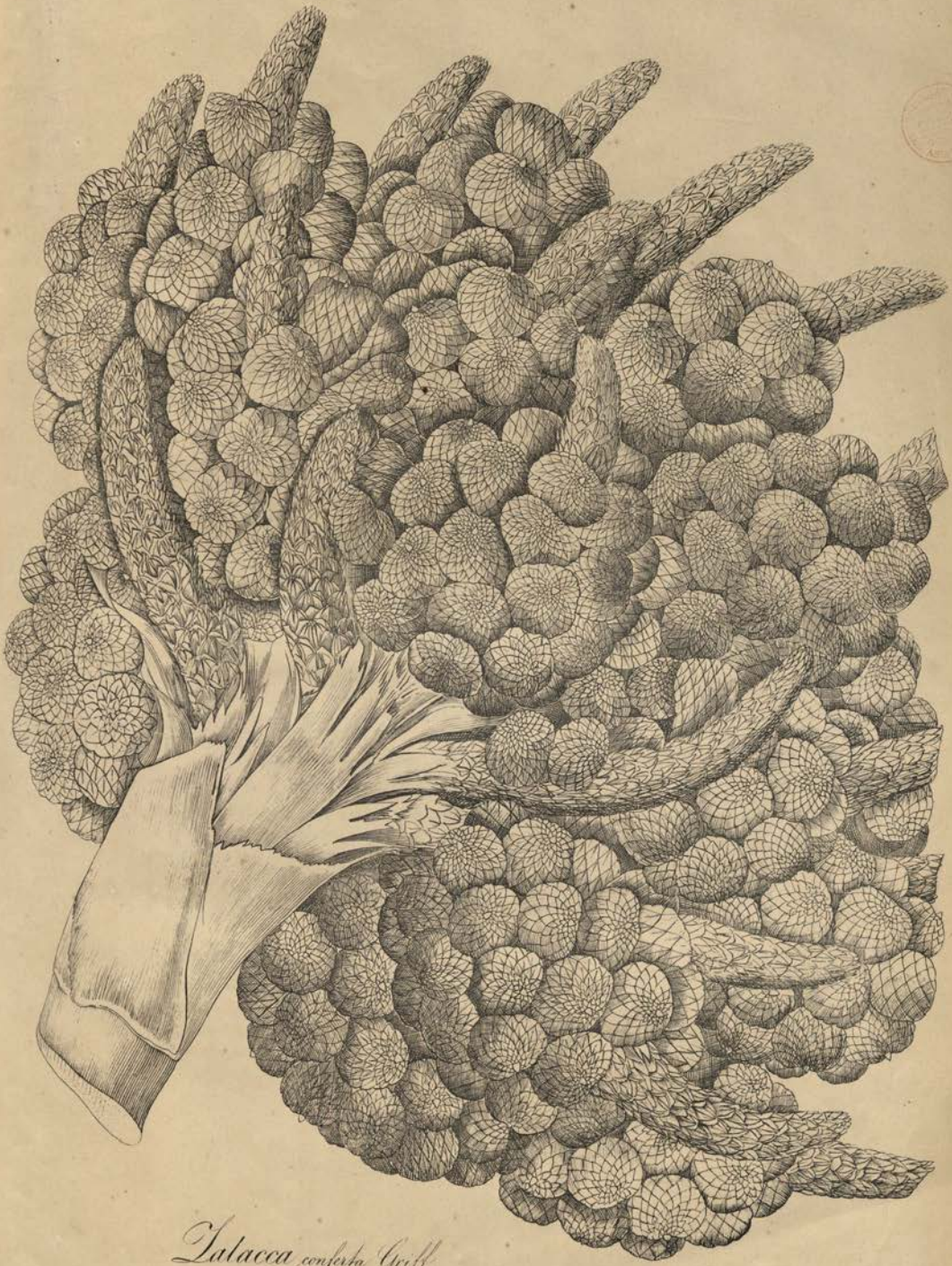
I have specimens marked doubtfully, *Asam-paiah*, in which the leaves are three feet long, nearly opposite, and closer together, with the central carina of the upper surface bristly above the middle, the spines of this are fuscescent. And I have others, marked also doubtfully, in which the pinnules or leaflet are much smaller, distinctly alternate, and distant, with appearances of being interrupted, but otherwise agreeing with those of *Z. conferta*.



Salacca conferta Griff.



Salacca Conferta Griff.



Zalacca conferta Griff.

II. SAGUS.

GENERIC CHARACTER.

Rumph. Hb. Amb. 1. *p.* 72. *t.* 17. 18 *(partim)* metroxylon. *Rottb. Koing in Ann. Bot.* 1. *p.* 193. *pl.* 4. *Martius Palmæ p.* 214. *t.* 102. 159. *Endlicher. Gen. Pl.* 250. *no.* 1742.

SPIKES ternate, amentaceous. FLOWERS hermaphrodite, masculine, or polygamous, disposed in pairs. BRACTEOLES woolly, membranous, sometimes stalked. STAMENS 6. OVARY covered with scales. STYLES often somewhat triangular, and tridentate. FRUIT dry scaly, 1-seeded. ALBUMEN furrowed. EMBRYO placed behind.

HABIT, Palms of the Asiatic Archipelago, flowering only once, and then dying.

TRUNK large and often tall, surmounted on the top by a crown of leaves.

LEAVES consist of two rows of long sword-shaped leaflets, the SHEATH and PETEOLE often armed with straight spines.

INFLORESCENCE proceeding from the summit, often piramidal. SPATHES several, incomplete, and either unarmed or covered with straight spines. FLOWERS often somewhat red.

OBS.—This genus differs from *Zalacca* in habit, as well as in its dry seed, and externally furrowed albumen.

1. SAGUS KONIGII.

TAB. CLXXXI.

Petiolis armatis, spadicibus inermibus, floribus exsertis hermaphroditis vel masculo et hermaphrodito, dentibus calycis cordato-rotundatis, stylo conico elongato.

Metroxylon Sago. *C. Konig. An. Boi.* 1. 193. *pl.* 4. M. læve. *Mart. Palm.* 215. *(excl. syn. Rumph. et Roxb.)* Sagus Rumphii. *Hort. Kew.* 5. 281 ?

The appearance of these palms is somewhat peculiar, and not like that of *Cocos nucifera* or cocoanut. The following description is derived from specimens of the spadix just before the expansion of the flowers.

Panicle alternately branched, the branches spreading, and covered with appressed spathes.

The *spikes* are amentiform, alternately bracteate, about a span long, somewhat recurved, surrounded at the base by broad imbricating bracts. The *peduncles* are included, bearing a bi-carinate spathe with, very woolly margins. The *bracteoles* very woolly.

The *flowers*, are placed in pairs, one being male, the other female, almost sessile, the upper third exserted from, or projecting above the bracts and wool.

The *calyx* is infundibuliform, striate, attenuated at the base into a short pedicel, tri-dentate, with the margins of the teeth sub-membranaceous : and the teeth themselves tinged with reddish brown.

The *corolla* is about one third longer than the calyx, striate, and coriaceous, with the exserted part of a reddish colour.

The *stamens* of the male flower are the largest ; the *filaments* are flat, broadly subulate, monadelphous to some distance upwards, and united also to the corolla ; the *anthers* are large, attached high up by their backs. A rudimentary *pistil* occurs, consisting of three oblong bodies, precisely like very rudimentary carpellary leaves.

The *hermaphrodite flower* of each pair, is situated on the right (looking at the spike in front). The *stamens* are smaller than in the male, united to the corolla up to the base of its segments.

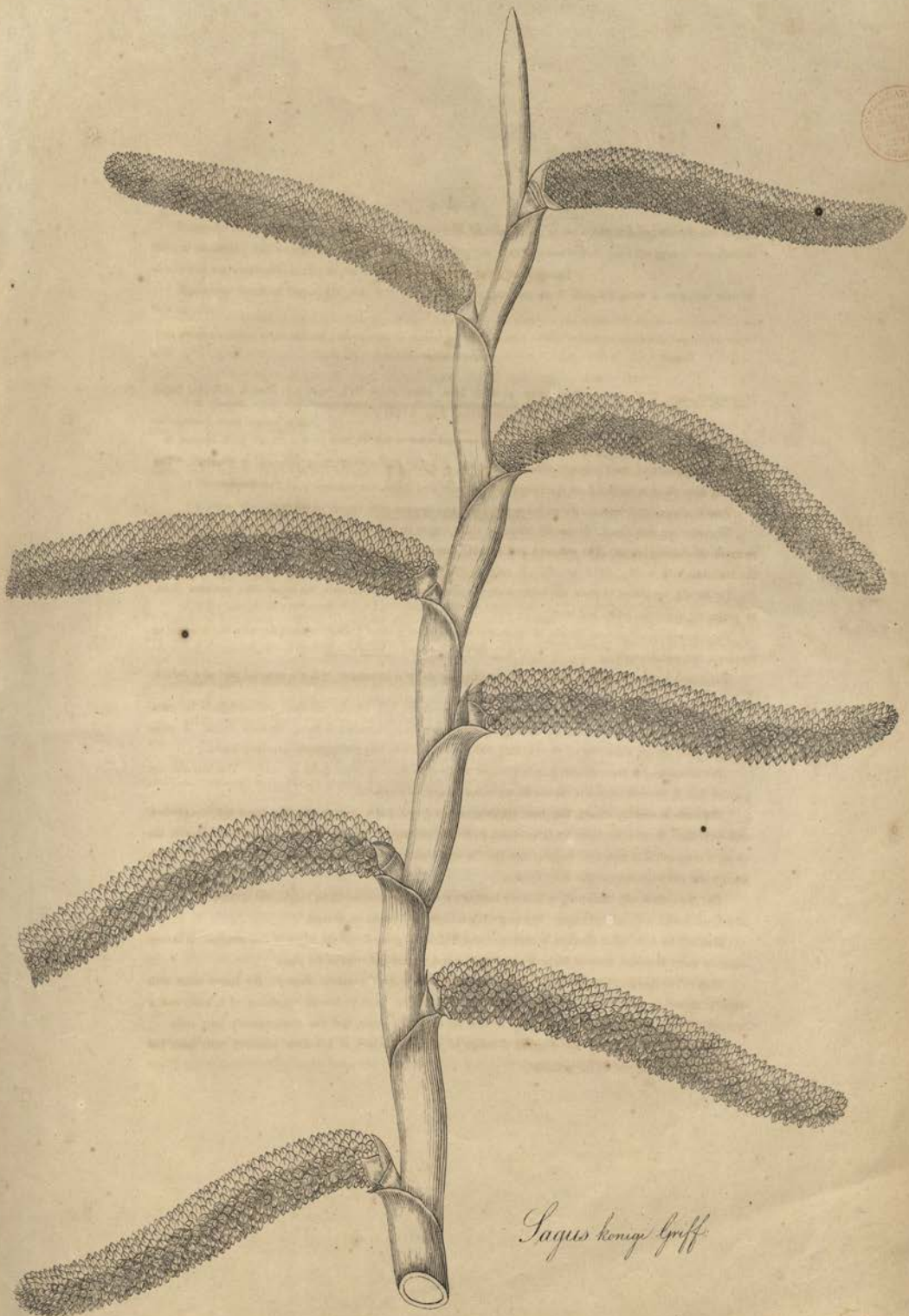
The *ovary* is roundly oblong, the upper half being covered with a few large scales. The lower half being naked, and very thin. In this part there are three ovules, ascending, anatropous, but it is difficult to ascertain whether the ovary is three-celled or not, from its great tenuity. The *style* is conical, trigonal, and tri-dentate at its apex, the teeth being ovate and stigmatose on the inner surface.

The *fruit* when very immature, is between turbinate and globose, pointed by the style, and covered with scales, of a green colour, with ciliated edges. The *seed* while it is yet very immature, is erect.

HAB.—This tree, called *Rumbiya*, is cultivated about Malacca, generally on the edges of rice swamps. It is very common about Rumbiya, between Malacca and Ayer Punnus, whence the name of the place.

OBS.—The specimens were brought to me when at Malacca, under the name of *Rumbiya*. No leaves came with them. It appears to differ sensibly from *S. lævis*, of Dr. Jack, in the pairs of flowers consisting of a male, and a hermaphrodite, in the size and exsertion of the flowers, the coadunate ovaria, and the comparatively long style.

I may also mention that the common *Rumbiya* of Malacca, (which is I believe identical with this), has distinctly calamine spines on the petioles.



Sagus konigi Griff

It appears to differ from *S. Rumphii*,* of Professor Von Martius, chiefly in the spadices being smooth, and in the teeth of the calyx; but taking the phrase "spadicibus lævibus" in what appears to have been the general acceptation in which it was employed, it may be the *S. Rumphii* of Willdenow,† and Blume.‡

Rumphius' figure of Sagus, *Hb. Amb.* 1. t. 17. quoted by all authors as *S. Rumphii*, gives a very fair idea of this species.

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* *S. Rumphii*, petiolis spadicibusque armatis, floribus exsertis masculo et fœmineo, dentibus calycis ovatis acutis, staminibus floris fœminei anantheris, fructu depresso globoso.

S. Rumphii. Wild. Sp. Pl. 4. 404? *Roxb. Fl. Ind.* 3. 623? Sagus seu Palma farinaria. *Rumph.* 1. 72. *t.* 17. 18. *Ham. Comm. Hb. Amb. in Mem. Wern. Soc.* 5. 318, Metroxylon Rumphii. *Mart. Palm* 214. *t.* 102. 159.

† Hortus Kewensis.

‡ In adnot: Mart. Palm, 215.

2. SAGUS LÆVIS.

TAB. CLXXXII.

Inerme, floribus minutis villo obtectis hermaphroditis, ovariis tribus medio cohærentibus, stylo nullo, fructu globoso vertice depressiusculoue.

S. lævis. *Rumph. Hb.* 1. 76. *fide. Jack. Jack. Mal. Misc. Mem.* 3*rd in Hook. Comp. Bot. Mag.* 1. *p.* 266. *Ham. Comm. in Hb. Amb.* 5. 320. *Sagus inermis. Roxb. Fl. Ind.* 3. 623 ?

"This valuable *Tree* rises to the height of about twenty feet, and is generally surrounded by numerous smaller and younger plants, which spring up around it after the manner of the Plantain *(Musa sapientum)*.

The *stem*, which is about as thick is that of the Cocoanut tree, is annulated by the vestiges of the fallen leaves, and the upper part is commonly invested with their withered sheaths.

The *leaves* resemble those of the Cocoanut, but grow more erect, and are much more persistent, so that the foliage has not the same tufted appearance, but has more of the graceful ascending curve of the *Saguerus Rumphii*: they are pinnate, unarmed; the leaflets linear, acute, carinate, and smooth.

The tree is from fifteen to twenty years in coming to maturity, the fructification then appears, and it soon after decays and dies.

The *inflorescence* is terminal; several *spadices* rise from the summit of the stem, enveloped in sheaths at their joints, and are alternately branched. It is on these branches that the *flowers* and *fruit* are produced, and they are generally from five to eight inches in length. They are of a brown colour, and closely imbricated with broad scariose scales, within which is a quantity of dense ferruginous wool, in which the minute flowers are imbedded, and completely concealed. Each scale supports two *flowers*, which are hermaphrodite, and scarce larger than a grain of turnip-seed.

The *Perianth* is six-leaved, of which three are interior, the leaflets nearly equal.

Stamens six; *filaments* very short; *anthers* oblong, two-celled.

Ovaria three, connected together in the middle, each monosporous. *Style* none. *Stigma* small.

Fruit single, nearly globular, somewhat depressed at the summit, but with a short, acute, mucro or point in the centre; it is covered with scales which are imbricated from the top to the bottom, and are shining, of a greenish straw colour, of a rhomboidal shape, and with a longitudinal furrow down their middle. Below the scales, the rind is of a spongy consistence, and the fruit contains a single *seed*, of rather an irregular shape, and having the *umbilicus* situated laterally a little above the base of the fruit. The progress of the fruit to maturity is very slow, and is said, according to the best information I can obtain, to occupy about three years from the first appearing of the spadices to the final ripening of the fruit. During the period of inflorescence, the branches of the spadix are brown, and apparently quite bare. Afterwards a number of small green knobs appear above the brown scales, which go on enlarging, till they at length acquire the size of a small apple. But few fruit come to maturity on each branch.

HAB.—Sumatra and Malacca, W. Jack.

OBS.—In habit and character this tree recedes considerable from the true *Palmæ*. Its propagation by radical shoots exactly in the same manner as the common cultivated Plantain, is peculiar, and is not observed in the true Palms.

Sagus laevis.

The terminal inflorescence, and death of the tree after fructification, is another peculiarity. It is allied to *Calamus* by its retroversely imbricated fruit.

This species of Sago is abundant in many parts of Sumatra and at Malacca, and is employed in the preparation of Sago for food. Considerable quantities are made at the Poggy Islands, lying off the west coast of Sumatra, where, in fact it forms the principal food of the inhabitants. The Sago of Siak is remarkably fine, and is also, I believe the produce of this species. At the Moluccas the spinous sort is considered superior to this, but I am doubtful whether it exists in Sumatra. For making the Sago, the tree must be cut before fructification commences, as it then becomes hard and dry. The process of making it has been so often described, that it is needless to repeat it here." —W. JACK. loc. cit.

III. CALAMOSAGUS.

GENERIC CHARACTER.

SPIKES round or terate, amentaceous. FLOWERS hermaphrodite, solitary, half concealed in wool. STAMENS 6. OVARY covered with scales, three-celled. STYLE subulate or tapering to a point, three-toothed. FRUIT dry scaly. SEED perpendicularly excavated. ALBUMEN ruminated or furrowed on the surface. EMBRYO vague or uncertain in its position.

HABIT. Perennial climbing Palms, natives of the Mountains of the Malayan Peninsula. LEAVES pinnate, petiolary sheath armed with straight conical prickles. LIGULA large, prickly like the sheath, distended, and boat-shaped above, widely extended with the petiole below. LEAFLETS alternate, wedge-shaped, with unequal terminal margins, gnawed and eroded from the middle upwards, below glaucous. The inflorescence is like that of *Zalacca*, or *Sagus*. Spathes many, incomplete, unarmed.

OBS.—This genus has the leaves of *Caryota*, or *Harina*, the habit of *Calamus*, and the seed of *Sagus* and *Zalacca*, but it is distinguished from all these in the form and development of the LIGULES or leafy expansions at the base of the petioles

The generic character requires some modification, as will be seen from the description of the fourth species, *C. ochriger*, of which specimens were received by me from Malacca, after the above generic character was drawn up. The alteration required is chiefly however as regards the form of the ligula, which appear to vary remarkably.

1. CALAMOSAGUS LACINIOSUS.

TAB. CLXXXIII.

Petiolo (partis lamelliferæ) aculeis sparsis uncinatis armato, pinnis petiolatis cuneato-obovatis, medium supra varie et argute inciso-dentatis, spicis patentissimis palmaribus gracilibus, pedicellis spatha inclusis spicem supra vaginulam brevem ferentibus.

The specimens from which the following description of this species is afforded, consist of portions of both a leaf and a spadix. It is a dicœcious ? flagelliferous, and to a great extent, a climbing species.

The *petiole* is angular above; below, it is slightly convex, and armed with scattered, hooked and short, white, dark-pointed thorns.

The *leaflets* are attached to the midrib by distinct stalks; the stalks are much compressed, and about half an inch long, while the leaflets are about seven inches long, by three and half inches broad, and plicate; those leaflets which compose the lower half of the leaf, are distinctly cuneate or wedge-shaped, and quite entire, but those composing the upper portion, are half-ovate, and variously jagged, with their point prolonged into a lengthened acumen; they are glaucous, and coriaceous, the under surface presenting as many distinct veins, as there are large incisions.

The *spadix* is much branched, and covered with imbricated smooth spathes, with short, oblique, acute, and sub-erect limbs. The branches of the spadix are axillary, widely spreading, and similarly covered with spathes, from which the spikes project.

The *spikes* are cylindrical, from three, to three and a half inches long, and three or four lines broad, having a woolly appearance; their pedicels are almost entirely enclosed. The *bracts* are rounded and imbricated, the lowermost are empty; the wool appears altogether to take the place of bracteoles.

The *flowers** are solitary, half immersed in the wool, which is exceedingly dense. The *calyx* is short, quite immersed in wool, with three broad, acute teeth. The *corolla* is deeply tripartite, its segments are oblong, spreading, and exserted.

The *stamens* are six in number, and are united to the corolla at the base of its segments. The free portion of the *filaments* broad, and very short, united into a very short annulus. The *anthers* are large, linear, and sub-sagittate or somewhat arrow-shaped at the base.

The *Ovary* occupying the tube of the corolla, is surrounded by the filaments, and covered with toothed scales; after fecundation it becomes quite exserted.

The *style* is subulate, rather long, and minutely three-toothed at the apex. The *fruit* is turbinate apiculate, and the scales are greenish, with brownish margins.

* The flowers appear to be solitary, for they correspond with the central line of their respective bracts, and I have not seen any rudiment of others in the very dense wool surrounding the base of the flower.

The *seed* presents a large excavation situated superiorly, and filled with a brown cellular substance.* The *albumen* is of a horny consistence, and ruminated. The *embryo* is vaguely placed, and of an ob-conical shape.

This species appears to be intermediate between *Calamus*, *Sagus*, and *Zalacca*, having the habit of the former the inflorescence of the second, and in some measure, the seed of the last mentioned genus, to which it approaches, as also the succeeding, through *Zalacca glabrescens*, and *Z. secunda*.

I observe, that a gummy matter is secreted from wounds in the spadix of this species.

HAB.—In woods along the sea-shores of the Islands of the Mergue Archipelago. *March* 1835, *Mergue Herb No.* 1104.

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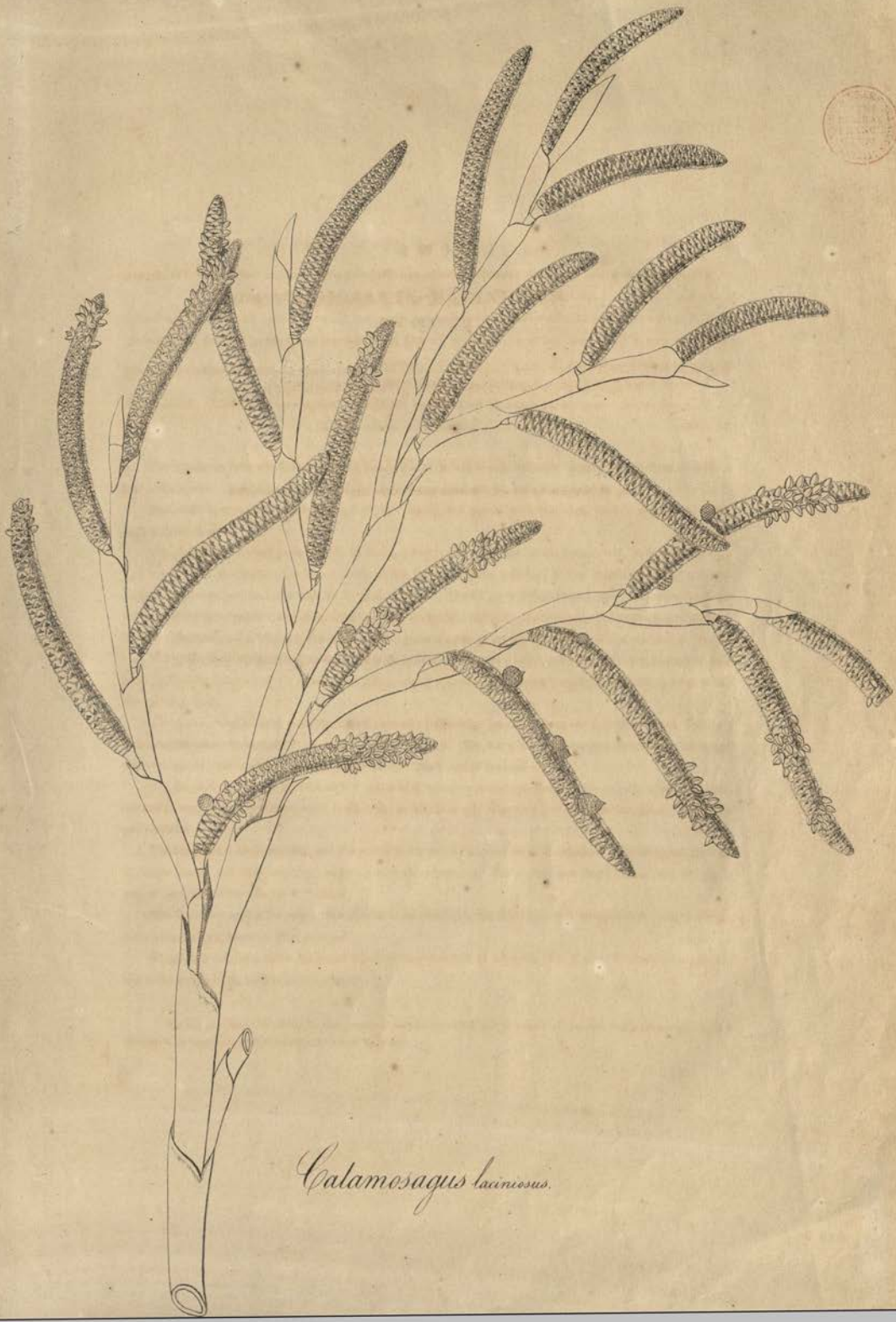
* My MS. written on the spot says, "Excavatio supera maxima, materie cellulosa brunnea repleta."



Calamosagus laciniosus.

2. CALAMOSAGUS HARINÆFOLIUS.*

TAB. CLXXXIV.

Petiolo (partis lamelliferæ) aculeis sparsis uncinatis armato, pinnis cuneato-obovatis medium supra obtuse dentatis et erosis, spicis spithamæis directione irregularibus, pedicellis paullo exsertis apice vagina ore lacera obtectis.

The specimens affording the description of this species, consist of the portion of a leaf, and an immature spadix. The *leaves* resemble those of the preceding, but the teeth and incisions are less deep and obtuse, in which respect it presents the same difference from the preceding species that *Caryota obtusidentata* does from *Caryota urens*. The shape of the *spadix* is much less like that of a genuine *Sagus*, than that of the preceding, the branches are more slender, and they are covered with long smooth spathes, with lacerated mouths.

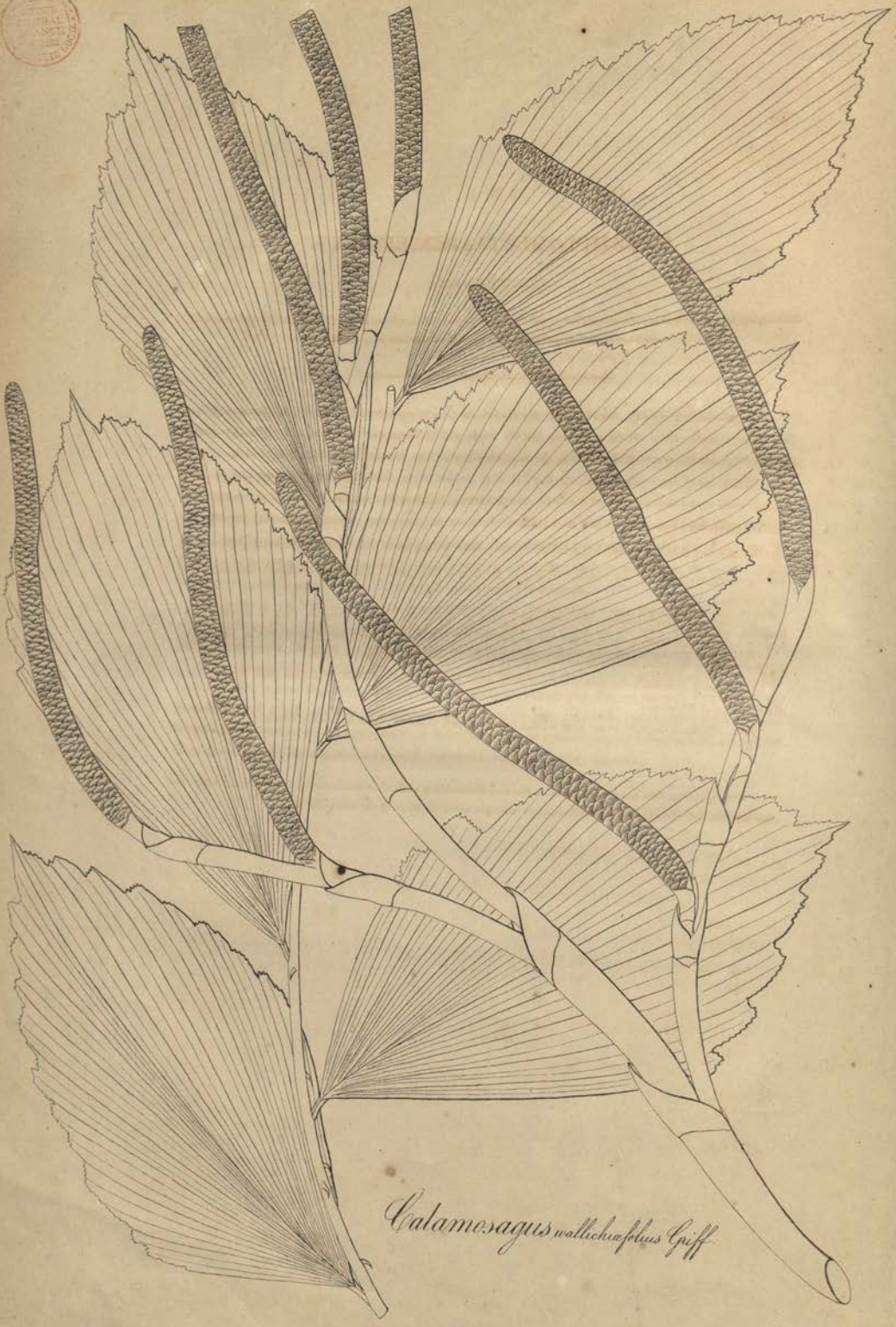
The *spikes* are a span long, by four lines in diameter, though they seem very immature; generally they are just exserted or raised from the sheath, but occasionally the pedicel is lengthened; the lateral pedicels are plano-convex, bearing a long spathe about the middle, reaching to the base of the spike. The *bracts* are broad, and longer than the very dense wool.

Although very closely allied to the preceding, I have no doubt but that this species, when it becomes better known, will be found to be quite distinct. At present the differences are confined to the obtuseness of the teeth of the pinnules, the direction and length of the spikes, and the large bracts on their pedicels.

I have never seen the living plants, the specimens were procured by my Malay Collector from the interior of the Province of Malacca.

HAB.—Malacca, brought to me from a place called *Kussan*, under the name of *Rotang Simote*.

* The species has been inadvertently named on the plate *Wallichiæfolius*, under which name it was first described by the author. *Cal. Jour. Nat. Hist.* Both names however occur indiscriminately in the Mss. and of the two, we prefer *harinæfolius Ed.*



Calamosagus wallichiæfolius Griff.

3. CALAMOSAGUS SCAPHIGER.

TAB. CLXXXIV. A.

Vaginis aculeolatis ligula maxima pariter aculeolata sursum scaphoiden, petiolo inferne nudo aculeis sparsis solitariis armato, flagello gracillimo deciduo! pinnis sessilibus anguste cuneatis, cum terminali biloba, margine apicem versus eroso dentato et denticulato.

This description, is taken from the upper part of a specimen not in flower, which was sent to me under the name of *Rotang Simote*, and from which, part of the generic character has been taken.

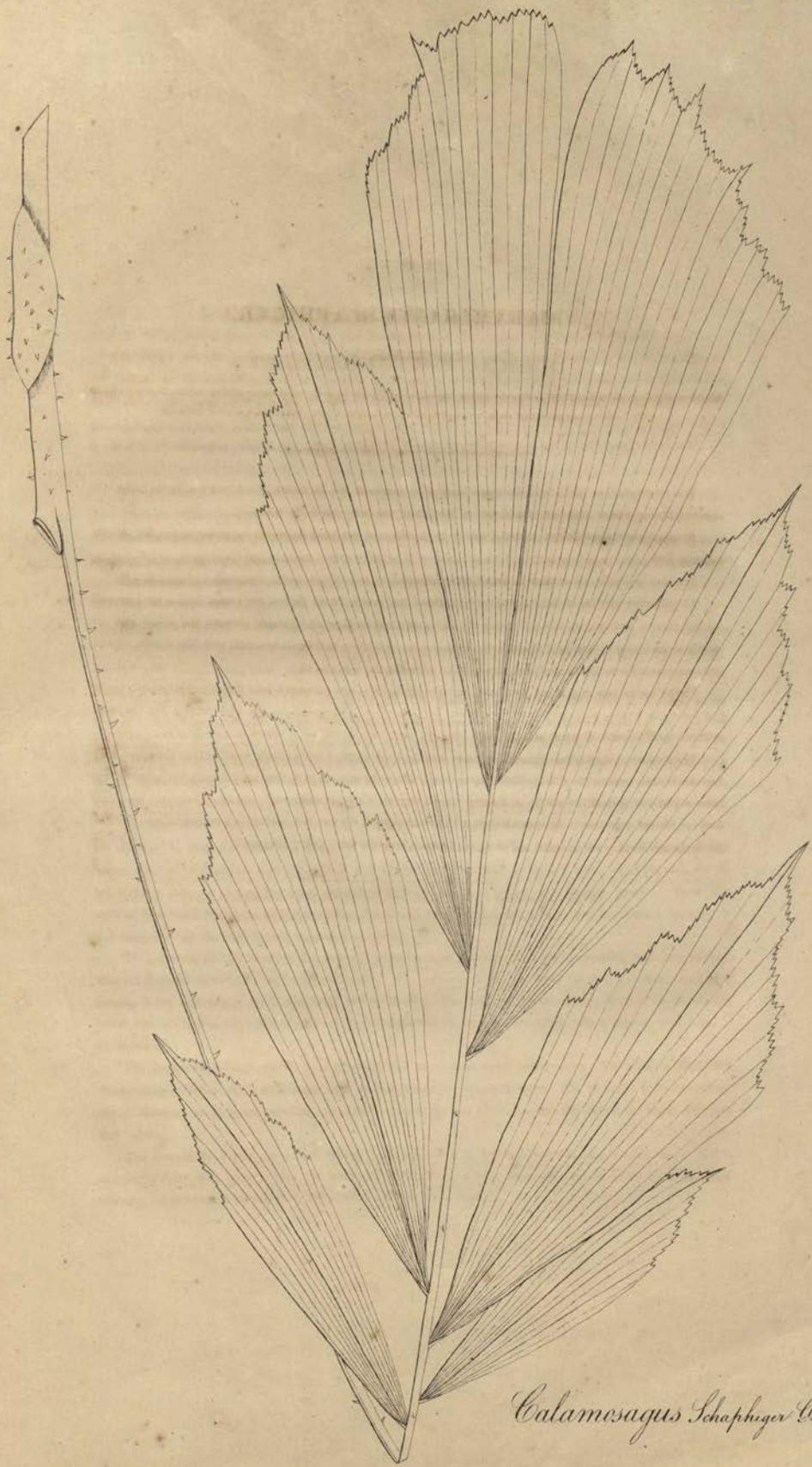
It appears to differ from the preceding species in the shape of the pinnules, which are sessile, and in the petioles being smooth.

The *stem* is slender, about three or four lines in diameter.

The petiolary *sheathes* in the exserted part, for about the length of six inches, are armed with a few scattered conical prickles, and are generally split along the back into a rete or fibrous net, which, between the petiole and the sheath, is prolonged into a large *ligule* of the same coriaceous texture, and similarly armed with the sheath. *Ligule* in its upper two-thirds boat-shaped, and closely half embracing the next sheath.

The *petiole* is two and a half feet long, and the young ones are prolonged into flagelli or whips; the naked part below the leaflets, is fifteen to seventeen inches long, roundish, and armed on the back with a few scattered prickles, such prickles as occur among the leaflets, are more hooked, and are disposed in a single row.

The *pinnules* or leaflets are distant, the lower ones are approximated more closely together than the upper, they are sessile, their general shape being distinctly cuneate; above the cuneate part, they are generally inequilateral, and eroso-dentate, of a thick substance, and many-veined, they are glaucous underneath, and altogether much like some forms of *Harina cariotoides;* the upper leaflets are more elongated, the terminal ones are sub-equilateral, and bi-lobed, above the middle they are truncate, and along the terminal truncate margin they are erose.



Calamosagus Schaphiger Griff.

4. CALAMOSAGUS OCHRIGER.

TAB. CCXV

Scandens, vaginis inermibus, ligula ochreiformi, petiolis flagelliferis dorsa per totam longitudinem aculeis binatis ternatis vel prehensilibus, pinnis 8-10 cuneatis, margine supra medium eroso, et obtuse dentato et denticulato, spicis gracilibus 6-unciatibus.

The description of this species is derived from two specimens of the upper part of the plant in flower. It is a climbing, palm of a general glaucous tint. The diameter of the *stem*, including the sheath, is only five or six lines.

The *sheathes* are unarmed! and produced beyond the base of the petiole into a short, truncate, ochreiform, closely embacing, brown process.

The *leaves*, including the flagellus, are about two feet long.

The *petiole* which bears pinnules or leaflets from the base, is angular, somewhat flattened, and the under surface is armed with distant, stout, claw-shaped prickles, generally disposed in clusters of two or three together, these are continued into the *flagellus*, where they are closer than they are on the lower portion of the petiole. The young petiole is covered with a ferruginous pubescence.

The *pinnules* or leaflets are ten to twelve in number, irregularly alternate, on short, flattened, ferruginous footstalks, leathery, cuneate, and about six inches long, by three wide, margins throughout the upper two inches of their length, eroso-dentate, and denticulate, the teeth ending in short, rather obtuse points. The upper surface presents about six primary striate veins, of which the central is subcarinate; between these, the under surface is striate white.

The *inflorescence* proceeds from the axils of the upper and smaller leaves, and is terminal, forming a panicle of three, to three and a half feet long. In the specimens examined, it consisted of three main branches, the lowest divisions of which are from the axils of still smaller leaves, so that the stem is really branched, each *branch* being about two and a half feet long, covered with long closely sheathing and limbless *spathes*. From the axils of these arise the spike-bearing branches of a similar structure, but much more slender, from a span, to a foot long, and like the main-branch, flexuosely undulated.

The *spikes* are slightly exserted, that is to say, project a short distance above the surrounding secondary spathes, they are from five to seven inches long, and slender. The *peduncle* is not adnate to the axis, it is compressed, and bearing when exserted, a small sheathing tertiary spathe. The lower bracts are empty; those of the flowers are broad, almost limbless, and suffulting a single flower, otherwise their sinuses are filled with a shorter wool than in *C. laciniosus*.

The *flowers* are solitary, oblong, hermaphrodite, with an obvious spiral arrangement. The *calyx* is short, and three-toothed. The *corolla* is divided nearly to the base, into three oblong segments. The *stamens* are six in number; the *filaments* are short, stout, subulate, and united below to the base of the corolla; the *anthers* are linear, sagittate, and adnate.

The *ovarium* is oblong, or conico-oblong, half covered with denticulate scales, the conical upper half is angular, sulcate, and horny: from the centre of the ovarium a very short *style* arises, ended by a papillose *stigma*; the ovarium is incompletely three-celled. Ovula three, erect.

Obs.—This species is certainly distinct from *Calamosagus harinæfolius*, which is again evidently distinct from *C. scaphiger*. It is distinguished from *C. laciniosus*, by the obtuse erosures of the pinnules, and the slender spikes, and from *C. harinæfolius*,—by the strong binate or ternate aculei or prickles, which are disposed throughout the whole length of the petiole,—by the shortness of the toothed margin of the pinnules, their coriaceous, less plicate nature, the absence of the transverse veinlets, and the slender small spikes.

Hab.—Malacca, where it was found by my collector, E. Fernandez, under the Malayan name, *Rotang Donam*.

IV. CALAMUS.

Linn. Gen. ed. 6. *p.* 173. *Gaertn. fruct. et sem,* 2. *p.* 267. *t.* 139. *(excl. C. Zalacca). Roxb. Fl. Ind.* 3. *p.* 773. *(excl. C. Zalacca). Icones.* 14. *t.* 28-29. *Suppt.* 5. *t.* 16. 17. 18. *Juss. Gen. Pl. p.* 37. *Syst. Veg. ed. Schultes.* 7. *Pt.* 2. *No.* 1496. *p.* 1332. *Martius Palm. p.* 203. *t.* 112. 113. 116. *f.* 2. 3. 4. 128. 160. *Endl. Gen. Pl. p.* 249. *No.* 1736, *Lam. Enc. Meth. t.* 770 *(excl.* C. *Zalacca).*

Palmijuncus. *Rumph. Hb. Amb.* 5. *p.* 97—120. *(excl. Palmijunco laevi) t.* 51—56. 57, *f.* 1. 58.

Tsjéru-tsjúral *et* katú-tsjúrel.. *Rheede, Hort. Mal.* 12. *t.* 64. 65.

Dæmonorops. *Blume in Syst. Veg. ed Schultes. pt.* 2. *p.* 1333, *obs.* 1. *Martius Palmæ. p.* 198. *t.* 117 *et* 125, *f.* 1. *Endl. Gen. Pl. p.* 249. *No.* 1740 *(excl. syn. Rumphii ?)*

GENERIC CHARACTER.

SPIKES, or sometimes racemes, filiform, paniculate. FLOWERS monœcio-dicœcious, that is to say, having male and female flowers on distinct spadices of the same plant, very often solitary. The MASCULINE FLOWERS are supported by bracts and cups, the latter each formed by two united bracteoles. The FEMININE FLOWERS are tri-bracteate. STAMENS 6. OVARY more or less covered with scales. FRUIT almost dry, one-seeded, rarely two-seeded, scaly; scales reversedly imbricated. ALBUMEN ruminate or foveolate on the surface. EMBRYO situated near to the hilum.

HABIT.—They are perennial, spreading shrubs, or small trees, erect, or often climbing.

STEM, at intervals where leaves are sent off, covered with their sheathes.

PETIOLARY SHEATH, variously armed with spines very often placed in rows, (in one case verticillate or whorled), flatly subulate; colour often variegated, sometimes very long.

PETIOLE variously armed above with spines or prickles, often extended into a whip-like thong or prolongation, the lower end of which is covered with palmate, hooked, prehensile prickles.

LEAFLETS alternate, in regular order, or fasciculate, linear, or oblong linear-lanceolate, in very few instances cuneately lanceolate, and often subulatly lanceolate, often rendered rough by means of somewhat sharp or sub-pungent bristles disposed towards the margins and the veins.

SPADICES axillary, often diffused, having the peduncle often cohering with the contiguous back portion of the sheath, or imperfectly extra-axillary, often armed, and often with the apex prolonged like the petiole, or with all such prolongations abortive.

SPATHES externally variously armed with spines, prickles, or bristles; or many are deciduous, the lower ones only being persistent, or all are persistent until the decay of the flowers, plain, boat-shaped, or tubular, remaining permanent with the fruit.

OBSERVATION.—This extensive and difficult genus requires much more extended examination than it has hitherto received, its limits at present do not appear to me at all well marked. It passes into *Sagus* through *Calamosagus*, and more distinctly perhaps through *Raphia*, into *Zalacca*, by means of *C. fasciculatus*. One or two species in which the albumen is scarcely ruminate, have a lateral foveola or umbilicus. *Plectocomia*, is perhaps, not sufficiently distinct. Calamus is now divided I believe for the first time into Sections, by means of characters derived chiefly from the inflorescence.

The sub-division indicated by Prof. Martius, into species with lori, and species with flagelli, would not include those which present neither of these kinds of cirrhose elongation, of which besides, both modes may occur in one plant.*

Few of the species hitherto published appear to me determinable, such for instance are *C. humilis, erectus, extensus, quinquenervius*, and *pencillatus* of Roxburgh, perhaps all those of Loureiro, and the following in Martius' great work on Palms, viz. *C. aureus* Reinw., *concinnus Mart., ruber* Reinw., *calapparius* Mart., *platyspathus* id, *Heleotropium guruba*, Ham. *Melanacanthos* Mart., *nitidus* id., *Hænkeanus* id., *ciliaris* Bl., *discolour* Mart., *asperrimus* Bl.

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* The only account of this extensive genus embracing all its known species, is that of Prof. MARTIUS, who, in his splendid work on Palms, after describing six species, gives short characters of the remainder, amounting to 46 or 52 altogether. This great Botanist divides them into those species which have the leaves flagellate, and those in which, by abortion of the spadix, the vagina is flagelliferous. But these conditions co-exist, so that the distinction does not form a good practical mark for subdivision. This illustrious Author does not appear to have had sufficient materials to enable him to distinguish even approximately, the numerous Sections of this particular genus. I find it useless therefore, to attempt to refer the species in my possession, to any of those previously described, except such as were figured.

Indeed the characters generally given, are so short, and regard so many different points at different times, that there is scarcely any contrast. The inflorescence too, even in cases where figures have existed, has not I think, been sufficiently attended to.

The Following is the mode in which this Genus is here disposed of.

SECTION I. CALEOSPATHES.

Climbing or erect. SPADICES diffused. SPATHES all persistent, tubular, limbs small or obsolete.

α. Erect without whip-like prolongations.

Calamus castaneus Griffith,
,, *collinus* id
,, *schizospathus* id
,, *macrocarpus* § id
,, *arborescens* id

β. Often climbing, furnished with whip-like thongs or prolongations, SPADICES either abortive or fertile, with an extended apex.

Calamus longisetus Griffith,
,, *ornatus* id
,, *flagellatum* id
,, *acanthospathe* § id
,, *axilis* § id
,, *Royleanus* id
,, *Roxburghii* id
,, *Rotang* § Roxb.
,, *tenuis* Roxb.
,, *leptospadix* Griff.
,, *fasciculatis* Roxb.
,, *gracilis* Roxb.
,, *mishmeensis* Griff.
,, *floribundus* id
,, *insignis* id

γ. Climbing. PETIOLE prolonged into a whip-shaped thong.

Calamus latifolius Roxb.
,, *geminiflorus* § Griff.
,, *palustris*, id

§ Additional species from the Author's Mss. of which descriptions were written subsequently to his publication on the subject, in the *Cal Jour. Nat. Hist. No. XVII. April*, 1844.

SECTION II. PIPTOSPATHES.

Climbing. PETIOLE often flagellate, SPADICES pointed, diffused. SPATHES 1, seldom 2, below persisting until the withering of the flower. SPATHES of the branches all deciduous.

Calamus	*verticillaris*	Griff.
,,	*Draco*	Wild.
,,	*geniculatus*	Griff.
,,	*longipes*	id.
,,	*Hystrix*,	id.

SECTION III. PLATYSPATHES.

Climbing. PETIOLE always whip-shaped. SPADIX diffused. SPATHES flat, all persistent until the withering of the flowers. SHEATH small or obsolete.

Obs. To this section belongs the *Katu-tijurel* Rheede, Hort. Mal. 12 to 65, referred by Roxburgh to his *Calamus latifolius*.*

Calamus	*leptopus*	Griff.
,,	*mastersianus*	id
,,	*ramosissimus*	id

SECTION IV. CYMBOSPATHES.†

Climbing or erect. PETIOLE often whip-shaped. SPADICES contracted. SPATHES cymbiform or boat-shaped, a long time persistent, the two external overlap the others. SHEATHE obsolete.

Calamus	*nutantiflorus*	Griff.
,,	*Jenkinsianus*	id
,,	*grandis*	id
,,	*intermedius*	id
,,	*Lewisianus*	id
,,	*angustifolius*	id
,,	*hypophilus* §	id
,,	*monticola*	id
,,	*calicarpus*	id
,,	*petiolaris*	id

* This species may be distinguished as *Calamus Rheedei*. PETIOLE and SPADIX armed with prickles, LEAFLETS distantly fasciculate linear lanceolate.

† Daemonorops of Martius and Blume.

1. CALAMUS CASTANEUS.

TABS. CLXXXV. A.B.C.

Humilis, spinis petiolorum plurimis valde inæqualibus parum seriatis, pinnis æquidistantibus (plurimis) linearibus (long. bipedalibus lat. uncialibus) vena centrali superne dentato-setigera centrali et lateralibus utrinque inferne setigeris, spadicibus sæpius inermibus, masculo supra decomposito elongato apice pendulo-nutante fructus quasi ambitu flabelliformi, calyce bracteam triplo-superante corollam subæquante: staminibus distinctis, floribus fœmineis conico-oblongis, fructibus rotundis vel oblongis (castaneo-rubris), cuspidatis.

This is a Palm with a short erect or decumbent stem, forming thick bushy tufts. The diameter of the stem with its sheaths, is about three inches. The specimens from which the following ample description has been drawn up, consist of entire male plants, several portions of male and female spadices, and an entire spadix in fruit.

The *sheaths* are rather short, and highly armed with spines, disposed in very long lines; the longest spines being nearly two inches in length.

The *petioles* are channelled to a considerable distance upwards, their naked portion is from three to five feet long, that is, to the point where they begin to bear leaflets; they are angularly rounded, and armed, especially on upper side, with stout and very unequal spines. The margins of the channelled part, are densely armed with bristles, disposed in short oblique lines. The pinniferous part is nine or ten feet long, convexly triangular, the convex side being armed with stout, solitary, and distant spines, pointing downwards; the upper angular part being smooth, or armed about the middle with short teeth.

The *leaflets* are very numerous, alternate, generally approximate, often nearly opposite, linear, two feet long, by nine or ten lines broad, and subulately acuminate at the apex. Above, on the upper surface they are rendered carinate by the prominent middle vein, which bears bristles towards the point. On the under surface the bristles are confined to the central vein and a lateral one on each side. In some, the bristles are very long, and the margins are sharp and cutting, from appressed bristly teeth; the apex is hispid with bristles, strong, and very acuminate.

The *spadices* are axillary, the peduncle in one specimen is armed, as are likewise some of the spathes slightly, but they are generally unarmed, concealed by spathes, and much branched, the male being decompound. The spathes are scarious, not much split, and generally quite smooth; limbs erect.

MALE *spadix*, two or three feet long, and branched; the branches are variously nodding, pendulous and slender. The flower-bearing branches are compound; the spikes are bifarious, the lateral ones are one inch long, the terminal, two or three inches, and often scorpioid. The uppermost branches are simple, or nearly so.

Male spikes much flattened, quite distichous, the bracts are highly imbricated, roundly cordate, and amplectent. Concealed within the bracts, is a cup with two evident teeth situated posticously, where it is also bicarinate from pressure.

The *calyx* is long, sub-cylindrical, slightly angular from pressure, with three rather short, half-ovate, acute teeth. *Corolla* a little longer than the calyx, divided below the middle into three linear-lanceolate, somewhat spreading segments.

The *filaments* are united to each other, and to the corolla as high up as the base of its segments: they are free, and as long or longer than the petals, their points being introflexed in the bud. The *anthers* are linear and exerted. Rudimentary pistil large, oblong, and composed of three abortive carpels.

FEMALE *spadix* rather broader than long, especially when in fruit; it is in length about one foot, in breadth one and a half foot. The flower-bearing branches are simple, about six inches long, and rather stout. The spathes are less imbricated, because they are placed more distant than in the male, and are likewise larger and more leathery.

Flowers solitary, each with two unequal amplectent bracteoles, the outer of which, from not being appressed to the inner, leaves on one side a small niche.

Calyx as in the male, but more cylindrical. *Corolla* scarcely longer than the calyx, of the same shape, divided below the middle into three linear-lanceolate, acute, erect segments. The *stamens* are much developed, but included, with effete or abortive anthers.

Ovary attenuate at the base, where it is smooth, at the apex it is attenuated into a stout, cylindrical, rather long style, divided nearly to the middle into three spreading or recurved branches, very papillose inside, scales small with irregular margins. *Ovula* lodged in the smooth base.

The immature *fruit* is chocolate-coloured, round or oblong, seven lines long by five and half broad, with a stout cuspidate or pointed apex, the upper half of which is grey; one-celled. The scales are small, with pale edges, the central furrows of the scales being well pronounced, and appearing to form as many continuous longitudinal furrows. The seed when very immature, is plano-convex, with a depression on the flat face; tegument black and fleshy.

HAB.—In thick jungles about Malacca, as at Pringitt, Ayer Punnus and Rhim. From whence it was sent to me by Emanuel Fernandez, with the name *Rotang chochoor*, as that by which it is known to the Malays.

OBS.—This species appears to vary a good deal, both as regards the arming of the petiole, and the male spadix, which is not always decompound, as well as in the fruit.

It may be at once known by the strong, very unequal solitary spines of the petiole,—the long linear leaflets, which have a tendency to become red in drying,—the short, much compressed, scorpioid, red-brown male spikes, the flowers of which are very close together, and by the expanded flabelliform shape of the fruit-bearing spadix.

The following varieties of this species may be noticed,

VAR. α.—Upper angle of the petiole armed with short thorns, fruit oblong.

,, β.—Upper angle of the petiole unarmed, fruit roundish.

Fig. 2, t. 58 of Rumph. *Herb. Amb.* 5, gives a fair idea of its fruit, as does that of the end of the female spadix, and fig. 1, t. 55, of the same part of the male spadix.

It possibly may be *C. ruber*, Reinw. Martius Palmæ. 209.

TAB. CLXXXV.A. Portion of male and female spadices *C. Castaneus*.

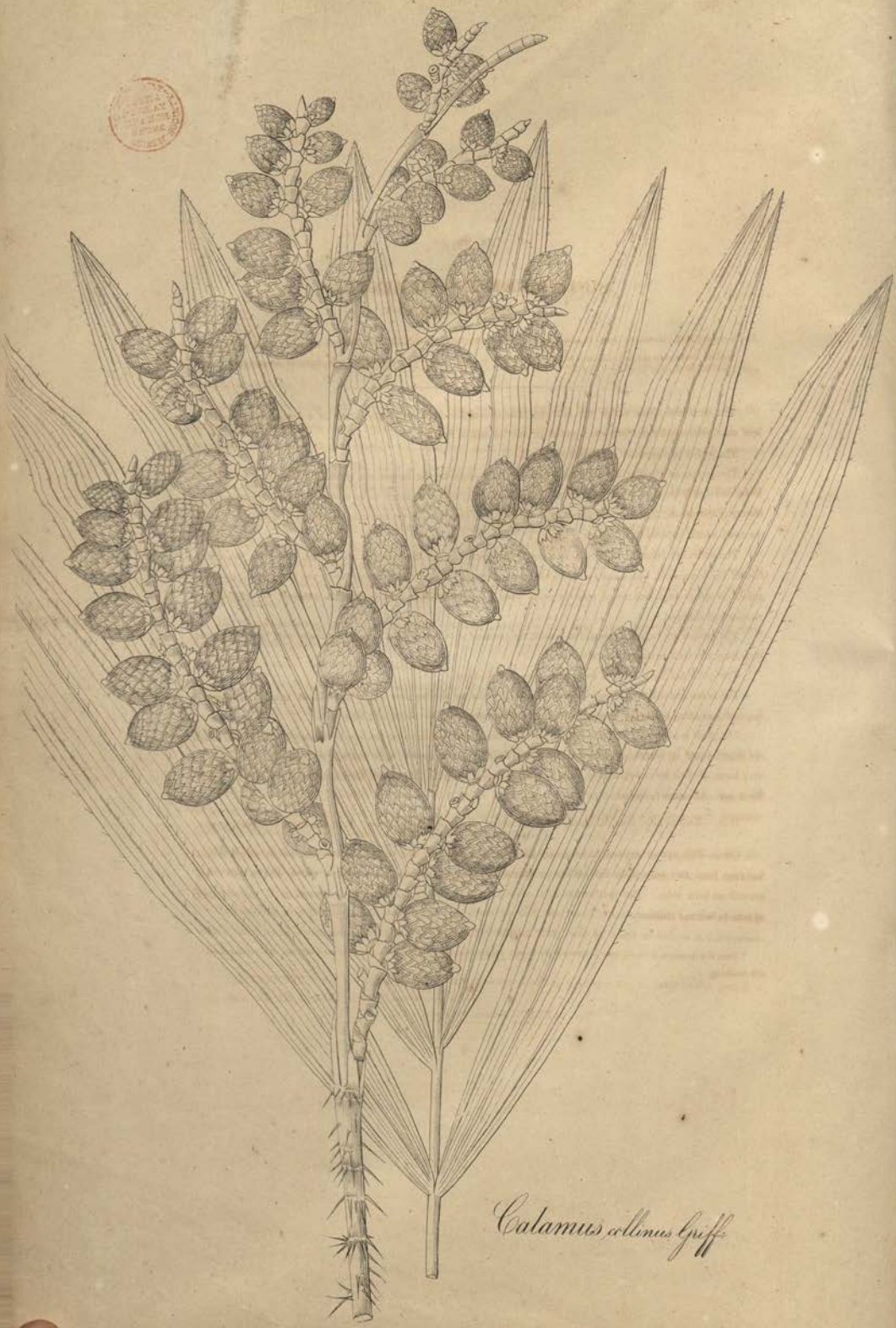
TAB. CLXXXV.B. Male spadix of ditto.

TAB. CLXXXV.C. Female spadix of ditto in fruit.

Calamus castaneus.

Calamus castaneus Griff.

Calamus castaneus Griff.



Calamus collinus Griff.

2. CALAMUS COLLINUS.

TAB. CLXXXVI.

Pinnis (apicis) lineari-lanceolatis (long. 15-uncialibus, lat. 1½-uncialibus) supra tricarinatis carinis setigeris subtus lævibus et glabris, pedunculis spadicis decompositi spathaque infima armato, calyce bracteam longe superante corollam subæquante, fructibus oblongis apice mammillatis.

The specimens, from which the following description has been drawn up, consist of a portion of the end of a leaf, one entire spadix in fruit, and a potion of another not in fruit.

The *petiole* is somewhat round and unarmed.

The *leaflets* or *pinnules*, are either alternate or nearly opposite, the largest are about fourteen or fifteen inches long, and nearly one and a half inch broad, linear-lanceolate, with a tendency to be spathulate; the upper surface is distinctly tricarinate, carinæ setigerous: the lower surface is smooth, and the margins bristly ciliate, especially towards the apex, which appears to be obtuse.

The entire specimen of the *spadix* is about twenty inches long,* the branches are distant, and with the exception of the lowermost, which has two branches, the others are simple. The peduncle below the first branch, or rather spathe, is compressed, and armed with the usual form of spines. Above this, the spadix presents no armature, is slender and deflexed.

The *spathes* are smooth, except the lowest, the remains of which present spines, its tubular part being about an inch long, the limb is lacerated and truncate.

The *spikes* are from three to five inches long, and flexuose.

The *bracts* are not very closely imbricating, their limbs are shorter than usual, and almost annular; the upper *bracteole* annular; the under one is attached behind or adnate to the spike, and bicarinate.

The *fruit* is about twelve lines long, by seven in diameter, surrounded at the base by the calyx and corolla, which are nearly equal in length, and much longer than their respective bracts; apex obtusely mammillate; the scales are very large, of chestnut brown colour, with pale membranous margins; the central furrow is broad and well developed. Seed one. Albumen ruminate.

HAB.—Khasya hills, near Mahadeb, at an altitude of about 1800, or 2000 feet. It is also found in Upper Assam.

OBS.—This species appears to be closely allied to the succeeding, the terminal part of the leaf of which, differs however from this species, in the leaflets or pinnules presenting only one rib or carina above, and in their being smooth on both sides. The spathes too, of *C. macrocarpus*, are always much lacerated, whereas in *C. collinus* they appear to become truncate.

* From this specimen, it would seem to approach the Section *Piptospatha*, but the spathes are evidently not deciduous, the tubular bases still remaining.

TAB. CLXXXVI. Pinnules, and spadix in fruit.

3. CALAMUS MACROCARPUS.

TAB. CLXXXVI. A. Fig. I, II.

The specimen from which this description is taken, consists of the upper part of a fruit-spadix, a detached spike and several loose fruits.

The *spadix* seems to be little more than a foot long, with short tubular lacerated spathes, armed towards the base as also the naked parts of the peduncle, with claw-shaped stout thorns. The apex is much attenuated, and armed with very sharp deflexed thorns. The detached *spike* is six inches long, stout and covered with scarious truncate *bracts*, variously split. The *spikes* of the apex of the spadix, are one or two inches long.

Fruit bifarious, surrounded at the base by the calyx and corolla, which are nearly equal in length, (the latter much split) and by barren stamens and two bracts, the inner of which last is cup-shaped, almost included in the outer, which is bicarinate next the axis. There are some appearances indicating an additional flower.

Ovate oblong, 1½ inches long, by 1 inch broad, stoutly mammillato-cuspidate. The *scales* are very large, (of the larger there are six series), deeply and broadly groved, of a whitish ochroleucous colour, with a black intro-marginal line, and pale edges, cartilaginous, horny, and shining. *Seed* one, erect, of black colour, with a thickish succulent cuspid integument.

The *albumen* is horny, much ruminated, the processes crowded, reaching to about half its depth, and filled with resinous-looking red-brown tissue.

This fine species, which approaches in the size of its fruit, and the large scales by which this is covered, to *Raphia*, is evidently allied to *C. collinus*, and *schizospathus*, and also to *C. Flagellum*.

HAB.—Near Koreahparah, one of the Bootea Dooars, from whence it was very kindly sent to me by my friend Major Jenkins.

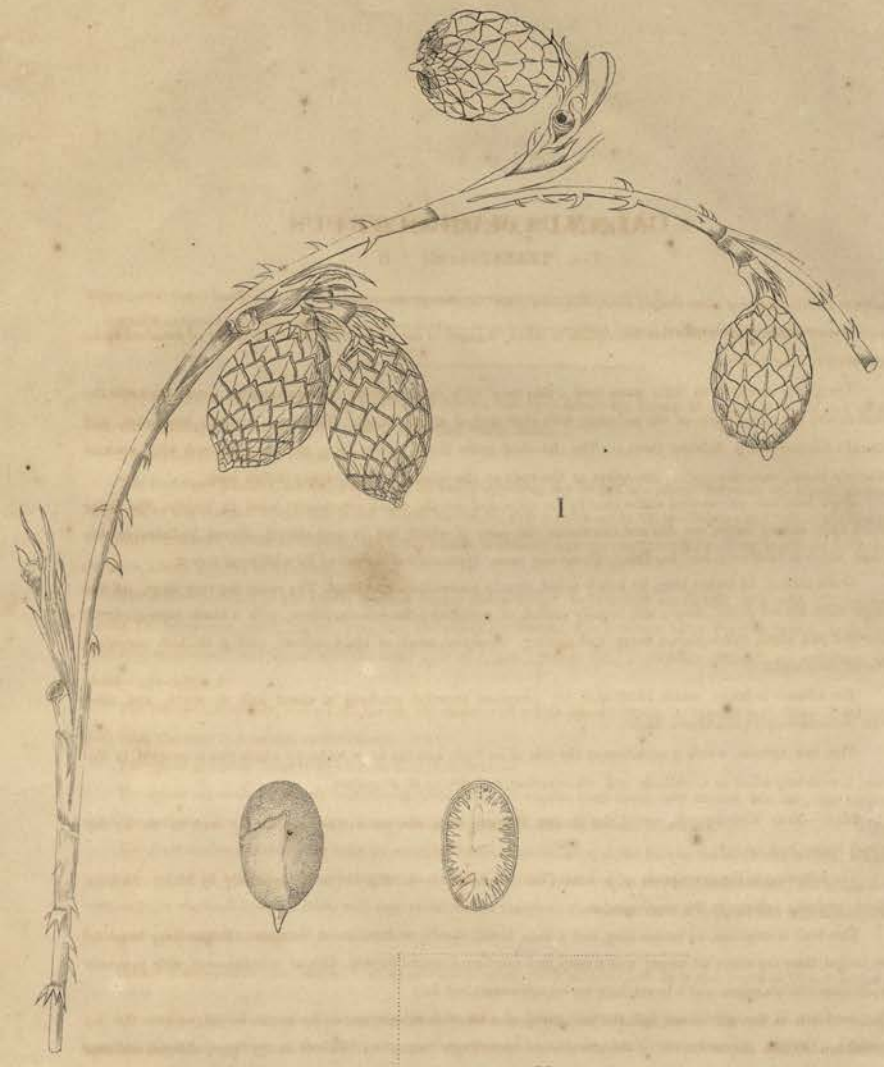
The following is the description of a fruit (Tab. CLXXXVI. A. Fig. II.) sent separately by Major Jenkins, which probably belongs to the same species.

This fruit is elliptical, 1½ inches long, and 8 lines broad, stoutly mammillate at the apex. Scales very large (of the largest there are about six series) with a deep, and very broad central furrow. Colour ochroleucous, with minutely denticulate whitish edges, and a broad dark brown intro-marginal line.

Seed one, of the same shape with the fruit itself, of a blackish colour, and as far as can be judged from the dry specimens, baccate. *Albumen* horny, cartilaginous, and exceedingly ruminate. *Embryo* cavity large, oblique, and near the base.

The locality in which the plant was found, from which this fruit was taken, is not specified, but the species is closely allied to *C. Jenkinsianus* and also *C. Flagillum*, yet distinct from both in shape as well as in rumination.

TAB. CLXXXVI. A. Fig. I. Upper portion of spadix of *C. macrocarpus* with ripe fruit. Fig. II. Detached fruit perhaps of the same. Fig. III. Detached fruit of *Calamus Jenkinsianus*.



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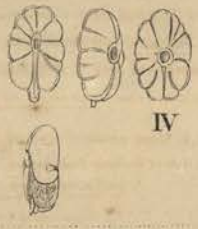

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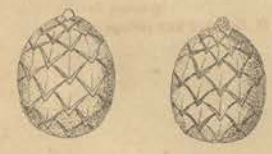

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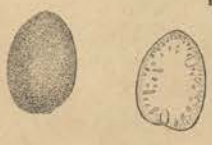
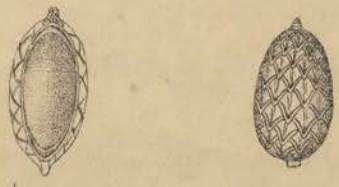
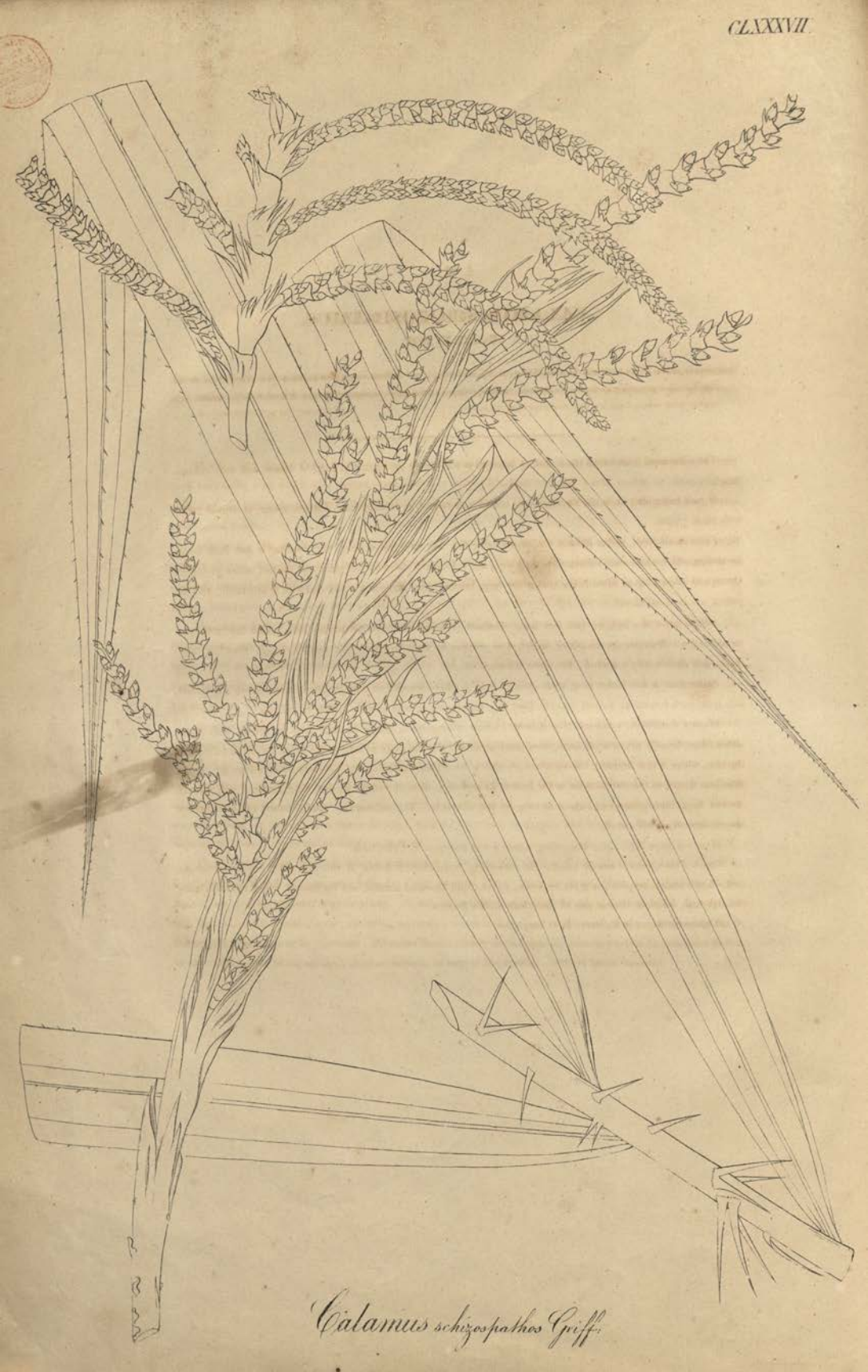




II

Calami.



Calamus schizospathos Griff.

4. CALAMUS SCHIZOSPATHUS.

TAB. CLXXXVII.

Pinnis equidistantibus lineari-lanceolatis (long. bipedalibus lat. $1\frac{1}{2}$ uncialibus) supra 1-carinatis subtus secus venam mediam setigeris, spathis omnibus inermibus primariis varie fissis et fibroso-laceris, ramis approximatis inferioribus decompositis, floribus distantibus, calyce bractea duplo longiore quam corolla duplo breviore, staminibus distinctis inclusis.

The specimens from which the following description was drawn up, consist of parts of leaves, and male inflorescence.

Petiole triangular, its under flat face being armed with ternary or solitary stout deflexed spines, of whitish colour with black points.

Pinnules alternate, rather distant, the largest being two feet two inches long, and one and a half inch broad, linear-lanceolate, coriaceous, subulately acuminate, paler below than above but not glaucous; the mid vein is prominent above, and below bearing towards the apex a few large bristles; the margins are provided with bristly teeth; and the points are as usual hispid.

Spadix one and a half, or two feet long. *Peduncle* covered with spathes having long, much lacerated, and striate limbs. *Branches* approximated, suffulted or propped by short lacerated split spathes, longer than the internodes, and distichously branched; the upper branches simple.

Spikes four or five inches long, with a tendency to gyration, scarcely or slightly compressed. *Bracts* amplectent, also split, each concealing a short three-toothed cup, broadly emarginate behind, anteriorly oblique.

Flowers distichous, comparatively distant. *Calyx* oblong-ovate, longer by half than its bracts, with three, rather short, broadly ovate, acute teeth, very much striated. *Corolla* twice as long as the calyx, and divided almost to the base, where it is attenuated, the segments are oblong lanceolate, and sub-acute. *Stamens* shorter than the corolla. *Filaments* united to the corolla as far as the base of its segments, distinct, rather long, subulate, flattened, and smooth. *Anthers* large, linear-oblong, and about as long as the filaments. The rudimentary *pistils* consist of three narrow carpels, scarcely at all united.

HAB.—Khasya Hills: also Darjeeling, where it was procured by Collectors.

OBS.—This species is closely allied to the succeeding, from which it differs in the pale colour of the armature, —the larger leaflets or pinnules green underneath,—the split lacerated sheaths, and the flowers, which are less closely and strikingly bifarious than in any of the others of this Section.

It also approaches in its leaves to *C. longisetus*.

5. CALAMUS ARBORESCENS.

TABS. CLXXXVIII. A. B.

Trunco erecto nudo 15-20 pedali, pinnis æquidistantibus lineari-lanceolatis (long. 13 uncialibus lat. 1 uncialibus) subtus albidis, vena centrali utrinque setigera, spadicibus supra decompositis longe pendulis, spathis primariis armatis, calyce bracteæ longitudine quam corolla triplo breviore, staminibus basi monadelphis.

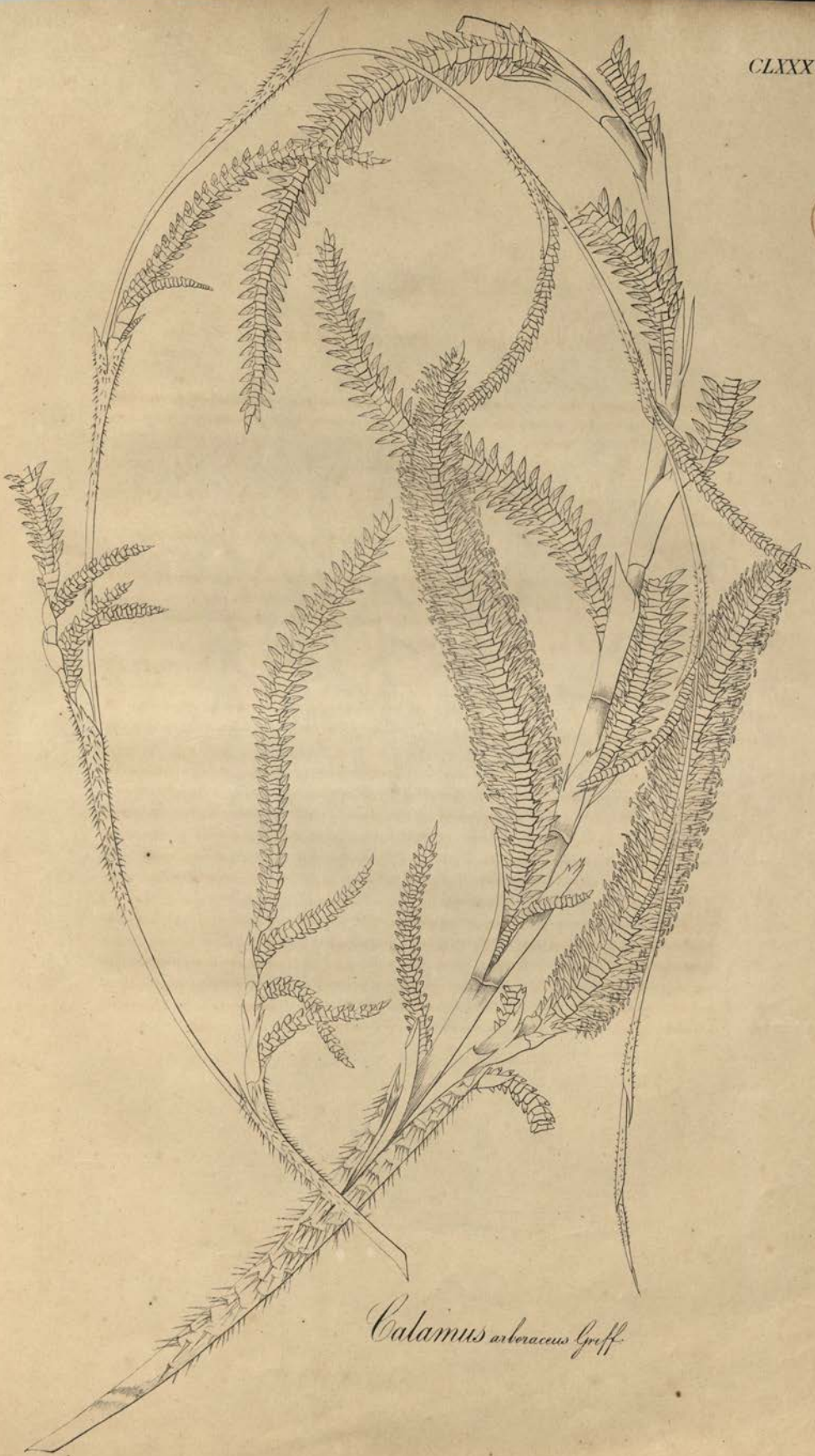
This is a very elegant Palm in some cases stoloniferous, forming at the base, apparently from off-sets very thick leafy tufts, from which arise elegant *stems*, fifteen or twenty feet high, two and a half inches in diameter, and annulated; the internodes are seven inches long, and of green colour. *Crown*, consisting of elegant ascending, gracefully curved leaves.

Petioles for two or three feet from the base, highly armed with large black flat spines, intermixed with small ones, in oblique, often nearly complete series, spreading in every direction; the pinniferous part of the petiole is trigonal, covered with whitish scurf, and armed underneath with nearly complete verticils or circles of spines. Spines, solitary or in pairs, also exist on the upper angle towards the base of the pinniferous part.

Pinnules or *leaflets* very widely spreading, alternate or often sub-opposite, rather distant, linear-lanceolate, the largest being eighteen or twenty inches long, and ten or eleven lines broad, acute, or acuminated into a cirrhose bristle; they are of dark green colour, shining above, and white below; the central vein above sub-carinate, and from the middle upwards on both sides furnished with distant stout bristles, margins very bristly and pungent, as also are the points, which are sometimes bifid.

Spadices about five feet long, pendulous, much attenuated towards the apex; the peduncles where naked, are smooth, compressed, greenish, and shining. *Spathes* from four to six inches long, tubular, clavate, with split erect limbs two to three inches long, often blackened, withered, and armed with scattered spreading black spines, except the uppermost, which are nearly or quite unarmed. The lower flowering branches are often de-compound, and two or three feet in length; the upper simple, their spathes short, inverted, unarmed, split, and blackened. *Spikes* five or six inches long, the younger ones rather flattened, with a tendency to be gyrate, and when in flower, to assume an inverted direction. *Bracts* rather closely imbricated.

Flowers rather large, greenish, oblique, surrounded at the base by a short cup, concealed in the bract, oblique in front, emarginate and sub-bicarinate behind. *Calyx* scarcely longer than the bract, ovate, and tri-partite to the middle, not striate; segments slightly scurfy. *Corolla* three times longer than the calyx, down to which it is divided into three oblong-lanceolate, acute, ascending segments; where it is enclosed in the calyx, fleshy. *Stamens* united to the corolla, up as high as its segments. *Filaments* thence shortly monadelphous, (sometimes two filaments are united to each other nearly to the anthers), angular, smooth, as long as the corolla. *Anthers* linear, exserted.



Calamus arboraceus Griff.

Calamus arborescens Griff.

Rudimentary *pistil* long and angular, consisting of three abortive carpels united to the middle, often with bifid points.

Female unknown.

Hab.—Pegu from whence the male plant was obtained by the Rev. Dr. Carey, and introduced into the Honorable Company's Botanic garden Calcutta in 1810, in which Buxoo, the head native gardener informs me, it has been called C. hostillis.

Obs.—This is a very handsome and well marked species; distinguished by its erect stems, dark brown almost black spines, and the leaves which are white underneath, long, and pendulous, and by the male spadices with the primary spathes armed. I should have been inclined to refer it to Roxburgh's *C. erectus*, had the whiteness of the under surface of the pinnules been mentioned in his description. It is closely allied to the succeeding species, *C. longisetus*.

Calamus arborescens, Tab. CXXXVIII. C., Tab. CLXXXVIII. A., Pinnules, portion of stem, and petiole, of ditto. Tab. CLXXXVIII. B. Male spadices of ditto.

Note.—The foregoing five species of Calamus, belong to the *erect*, and *eflagellate* portion of the 1st Section, Coleospathes.

I here subjoin short descriptions of three other species, which are probably also referrible to this group.

α. C. Erectus Roxb.

Shrubby, erect, no flagelli. *Leaflets* rather remote, equidistant, opposite and alternate, linear-lanceolate. *Spines* sub-verticellate. *Spadix* decompound. *Berries* oblong.

Sun-gotta, is the vernacular name of this plant in Silhet, where it grows with an erect trunk, like the true palms, of about 15 feet in height; when divested of the sheaths, from three to four inches in circumference, and the joints from two to three inches long. The poorer natives use the seed as a substitute for that of Areca.

β. C. Humilis Roxb.

Shrubby, not scandent not flagelliferous. *Leaflets* lanceolate, smooth, many-nerved. *Spines* few, but long and strong.

A native of Chittagong.

γ. C. Scipionum Mart.

Caudice robusto, articulis tripedalibus subulatis rutilis nitidis; frondibus breviusculis, vaginis rhachibusque aculeatis, pinnis ——; *spadice crasso decomposito, ramulis brevibus pauciflоris; baccis* ——.

C. Scipionum, Lour. Flor. Cochinch. I. p. 210. No. 3. Edit. Willd. I. p. 260. Lam. Encyclop. VI. p. 304. No. 3. Rees. Cycl. No. 3. Schult. Syst. Veg. VII. 2. p. 1326. No. 2, (exclusis synonymis Pluk., Rheed., Rumph) Sprang. Syst. Veg. II. p. 17. No. 9. *Arundo Rotang*, Pis. Mant. p. 188. c. icone (fide Loureiri.)

Hæc species scipiones suppeditat omnium elegantissimos, colore rutilo vel obscurius lutescente ac nitore insignes, unico plerumque articulo constantes.

Hab.—*In sylvis Peninsulæ Malaianæ ex utraque parte freti Malaccensis, unde abundanter in Sinas et in Europam exportator: Loureiro. In Cochinchina dicitur* "Heotau." Martius.

This last species, *C. scipionum* Mart., I imagine, is the well known Malacca cane. The plant does not appear to occur about Malacca itself, and I was informed that the canes are imported chiefly from Siak, on the opposite coast of Sumatra.

6. CALAMUS LONGISETUS.

TABS. CLXXXIX.A.B.

Subacaulis erectus, spinis petioli rectis (nigris) inferioribus seriatis, pinnis fasciculatis linearibus (long. bipedalibus lat. 1¾ uncialibus) plurifariis supra nitentibus 1-carinatis, vena centrali subtus setas longissimas gerente, spadice decomposito longissimo nutanti- pendulo spathis primariis infimis armatis secundariis glabris abbreviatis quasi truncatis, spicis rectiusculis compressis.

This is a tufted stemless species, with the habit of young specimens of *C. arborescens*.

Leaves slightly arched, often with the blade turned edgeways, their total length is 11 or 12 feet. *Petioles* armed throughout the lower naked part, (which is about three and half, to four feet in length), is armed with seriate, unequal, flat spines, of black colour, arising from a white base. The vagina is armed with longer but less seriate spines, and presents also, especially towards the margins, lines of bristles. Towards the apex of the petiole, the spines are solitary, and confined to the lower convex face.

Pinnules or *leaflets* fasciculate, but from the fascicles not being distant, this is not so apparent at first sight as it is in some others, plurifarious, some crossing over the others; all are arched and nodding, two feet in length, one inch and seven lines in breadth, coriaceous, convex and shining above, with one carina or rib, and occasionally a lateral bristle-bearing vein on each side; underneath, the central vein presents very long bristles; margins setosely dentate, apex hispid.

Spadices very long, whip-shaped, nodding, and pendulous; flagellus humifuse, or trailing over the neighbouring shrubs, and armed with the usual prickles. *Branches* pendulous, distant.

Spathes with very long sheaths, and lacerated scarious limbs, the primary ones are armed below with stout prickles like those of the spadix, above with a few slender straight spines, those of the branches truncate and unarmed.

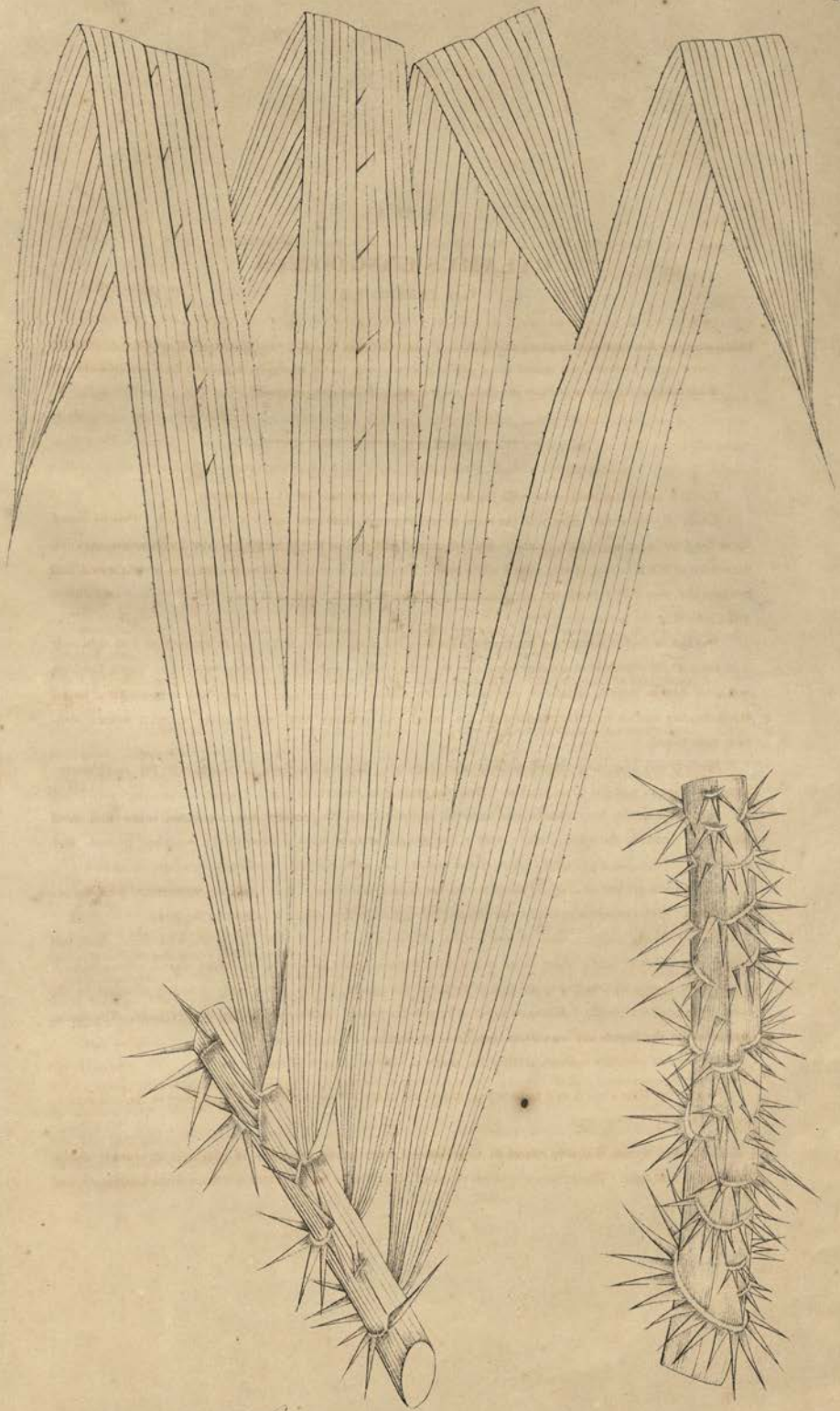
Spikes about six inches long and about two inches distant, distichous. *Bracts* annular, amplectent, with scarcely any limb. Cup concealed by the bracts, oblique, emarginate behind, where it adheres to the spike.

Flowers closely bifarious, oblique and curved. *Calyx* a little longer than the bracts, with three, short, half ovate teeth. *Corolla* nearly three times longer, tube narrow, nearly as long as the calyx; segments linear oblong. *Stamens* six, apparently attached to the faux or throat of the corolla, but in reality only adhering as usual to the cohering parts of the corolla. *Filaments* about as long as the petals. *Anthers* deeply sagittate, versatile. The above, description of the flowers has been taken from dried specimens.

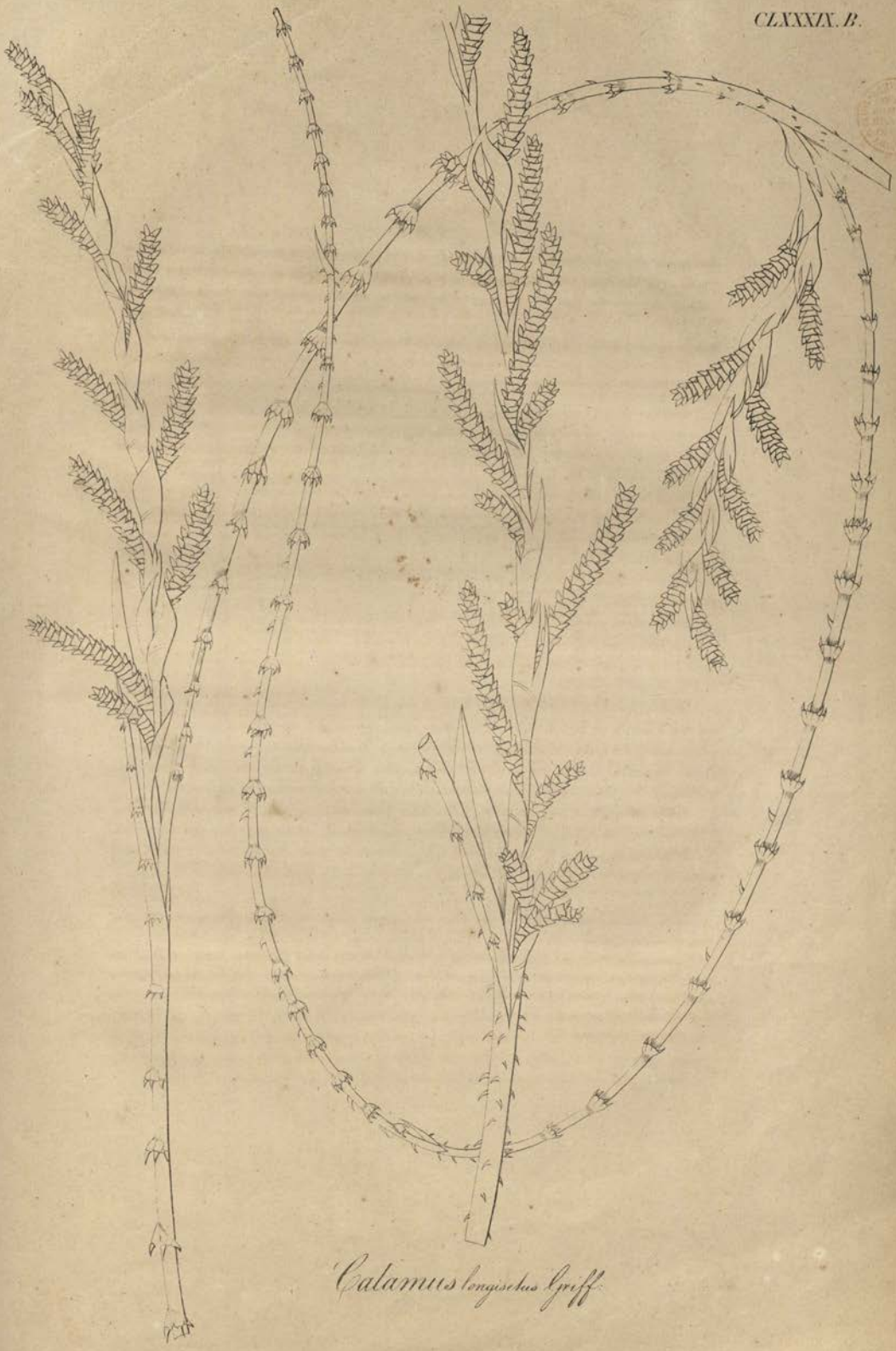
Rudiment of *pistillum* cylindrical tripartite, nearly as long as the tube of the corolla.

HAB.—The Male Plant is said to have been introduced to the Botanic Garden, where it flowers in the cold season, from Pegu, with *C. arborescens*.

OBS.—This species is closely related to *C. arborescens*, from young specimens of which, it is scarcely distinguishable at first sight. The armature is much the same, otherwise its leaflets, which are never white underneath, and



Calamus longisetus Griff.



Calamus longisetus Griff.

the flagelliferous spadix, abundantly distinguish it. In the Calcutta Garden, it appears to have been always confounded with *C. arborescens*, so much so, that although it is very ornamental, and easily propagated by its off-sets, from which its densely tufted appearance arises, yet there does not appear ever to have been more than one plant in the Garden.

From the succeeding species, *C. ornatus*, it is abundantly distinct, although it agrees with it in the great length of the spadix.

7. CALAMUS ORNATUS.*

Blume in Syst. Veg. ed. Schultes. 7 pt. 2. p. 1326. Martius. Palm. p. 204. t. 116. fig. 2.

Spinis (inferis) petioli pinniferi uncatis (albis), pinnis æquidistantibus lineari-lanceolatis (long. 2-2½ pedalibus lat. 2¼ uncialibus) supra 3-5 carinatis carina centrali versus apicem setigera, spadice longissimo 16-18-pedali, spathis tubulosis longissimis armatis, ramis paucis (subquaternis) distantibus, spicis scorpioideo-reflexis.

The specimen examined was an entire, flowering apex of a female plant. It is a stout species, the diameter of the sheaths being about two inches.

Sheaths swollen under the base of the petiole, and armed with a rather complete series of flat spines; rather short, and much broader than is usual in other species. The naked lower portion of the *petiole* which is about three feet long, is somewhat flat, and channelled broadly towards the axil, and much armed; the spines of the lower face resembling those of the vagina, but are smaller; those of the upper face are irregular and subulate from a stout base; the under convex face of the pinniferous part, which is nine or ten feet long, and convexly trigonal, is armed with stout hooked prickles.

The *pinnules* or *leaflets* are rather distant, large, linear-lanceolate, two, or two and quarter feet long, by two and a quarter inches broad, rather obtuse, generally bifid or two-parted at the apex, underneath they are glaucescent: the upper surface tricarinate or three-ribbed, their mid vein is furnished with stout pungent setæ towards the apex, as also the margins; apex hispid.

Spadix of great length (sixteen to eighteen feet long), as usual adhering to the next sheath, the lowest one in the specimen is abortive and flagelliform, the one immediately above, flower-bearing, and produced into a long flagellus seven or eight feet in length, and armed with the usual prickles. It bears four branches, at about two and half feet distance from each other, the two lowest internodes are entirely covered by the long tubular sheaths, the two uppermost with the peduncle exposed for a few inches at the base, where they are unarmed and plano-convex.

Spathes without limbs, those of the flagellus are inconspicuous, and all are armed, the spines on the lower face being like those of the vagina, but smaller; the rest deflexed, not very strong, and subulate from a stout oblique base.

Branches of the spadix erect, base concealed in the orifices of the sheaths, bearing alternate, scorpioid, stout spikes, two to three inches in length. Spaces between the spikes occupied by short, lax, truncate, smooth spathes.

* There is another Malacca species found about Ching, which appears to approach this. The following is a description of it from living specimens out of flower.

A large climber. *Sheaths* green, armed on the back with very broad, deflexed, either seriate or solitary spines. *Flagellus* very long. *Ligula* distinct. *Petiole* near the base armed with marginal, straight, distant solitary spines: otherwise armed along the dorsum, with a row of distant solitary hooked prickles. *Pinnæ* or *leaflets* alternate or sub-opposite, linear lanceolate, two feet long, two and half inches broad, acute, with five prominent bristle-bearing veins above.

HAB.—In dense forests, at Ching.

Spikes stout, somewhat compressed. *Flowers* in bud distichous, but not flatly bifarious; under each is a laxly sheathing bract with a short limb and shortly ciliate margins; outer *bracteole* obliquely cup-shaped, emarginate behind; the inner furnished with a conspicuous disk-like oval space on one side.

Calyx of stout texture, oblong, ovate, sub-oblique, shortly three toothed. *Corolla* ovate, tripartite below the middle; segments ovately lanceolate. *Stamens* six in number, large, effete or abortive, united as usual to the corolla, and above this monadelphous.

Ovarium oblong obconical, with numerous rows of very minute scales. Style stout, conical, divided nearly to the base into three stout, lanceolate, inwardly stigmatic branches. Ovules solitary.

Obs.—This is a very well marked species, especially by its stature and inflorescence; it appears to be more nearly allied to *C. schizospathus* than any other.

Hab.—In forests Malacca, as about Durion Toongull, where it was found by E. Fernandez. Malayan name, *Rotang Ruga Bodak.*

8. CALAMUS FLAGELLUM.

Scandens, vaginis albido-furfuraceis armatis spinis longis subulatis setisque spiniformibus innumeris. Petioli (brunneo-furfuracei), partis nudæ aculeis dorsalibus uncinatis, et spinis numerosioribus marginalibus, supra inter pinnas, aculeis dorsalibus tantum, pinnis sub-oppositis linearilanceolatis, long. bipedalibus et ultra, lat. 1½ uncial, carina supra et subtus vena media setosa. Spadice 8-10 pedali, pendulo-nutanti, spathis tubulosis infima compressa subancipita aculeis armata et spinis secus margines, reliquis (ut peduuculus) aculeis uncinatis validis, secondarius inermibus, ramis distantibus secundis, spicis infimis compositis. bractea lamina 1 lanceolata amplectent cupulam dorso axi adnatam includente.

The description of this species is derived from the entire upper portion of a male plant. It is a stout climbing species, the diameter of the stem, including the sheaths, being 15 to 17 lines. The *sheaths* are covered with thick white scurf and armed with long stout seriate, yet distinct deflexed scurfy spines, subulate from a broad flattened base, and between the series of these, it is provided with innumerable black spinescent bristles of all sizes. *Ligula* very large. *Leaves*, 6 to 7 feet long.

Petiole in the lower naked part which is 12 or 14 inches long, deeply channelled, and armed along the centre of the dorsum with a solitary row of large hooked prickles, along the margins with fascicled ones, being almost as long as the larger ones of the sheaths. Pinniferous part convex bifacial, above covered with brown scurf, armed below with marginal solitary or bi-ternate prickles, and a row of irregular ones along the middle of the dorsum, some being tooth-shaped and small, others claw-shaped and placed in threes, the central one much the longest; above, with these central ones alone.

Pinnules or *leaflets* sub-opposite the largest being almost the lowest 2 or 3 inches long, 17 or 18 lines broad, linear lanceolate, leathery, and subulately acuminate, above with a carina bearing stout almost thorny distant bristles, underneath similarly bristly, margin with spinescent bristles, apex hispid.

Spadix 8 or 10 feet long, united to the next sheath nearly as high as the base of the petiole, with from 6 to 8 distant branches.

Spathes tubular, the lowermost 1½ or 2 feet long, compressed, almost two edged, armed below on the dorsum with deflexed rather stout unequal spines, the marginal ones being the longest, above armed all over with smaller prickles.

The others, and especially the exposed part of the peduncles, armed with stout claw-shaped prickles.

Branches pendulous, secund or given off from one side, unarmed, slender, adnate to the peduncle high up, even sometimes above the mouths of the spathes.

Spathes tubular, truncate, unarmed, mouths more or less lacerate. Lower divisions branched, upper (spikes) simple, 8 or 10 inches long, adnate to the branch as high as the mouth of the spathes.

Flowers distichous, curved downwards. *Bracts* amplectent with a half lanceolate limb, concealing a deep cup, rather obliquely truncate and posticously adnate to the axis.

Calyx oblong, divided to about the middle into 3½ ovate segments with membranous margins. *Corolla* twice as long, divided nearly to the base into three narrow sub-lanceolate segments. *Stamens* 6, as usual united to the base of the corolla and with each other. *Filaments* (free) subulate, shorter than the corolla. *Anthers* linear, attached by the middle. *Pollen* yellow, Rudiment of the *Pistillum* large, consisting of three abortive carpellary leaves.

Fruit, (specimens from Major Jenkins) oblong-ovate 13 lines long, 9 lines broad, surrounded at the base by the spread out and more or less split perianth, the petals of which are more or less deficient, stoutly and mammillately cuspidate at the apex. Scales very large, very deeply furrowed, whitish or of red fuscescent colour, margins whitish with a brown intro-marginal line; the whole having a handsome sagine aspect.

Seed one, oblong. Tegument black, sub-baccate with a dichotomous obscure raphe? Albumen horny ruminate. Embryo basilar.

Major Jenkins says this is the fruit of the large *Pakhouri Bet* of Assam, and in another communication states it to belong to the whip-bearing Bet, *C. Flagellum*.

Its characters are to a considerable extent those of *C. Collinus*.

HAB.—According to Major Jenkins, it is found at Golaghat on the Dhunseeri river.

This species, for which I am again indebted to Major Jenkins, is allied to *C. ornatus*, between which and *C. longisetus* it should at present be placed. It is also closely akin to *C. schizospathus*, which may probably be one of the same section.

9. CALAMUS ACANTHOSPATAHUS.

TAB. CXC. A.B.

Spinis petioli——pinnis——spadicis (6 pedalis) pedunculo basi compresso spinis et aculeis subulatis armato cæterum inermi, spatha infima dorso carinata aculeis basi conicis sparsis valde armata reliquis parce armatis seu inermibus ecarinatis, ramis distantibus infimis compositis, fructubus elliptico-oblongis apice mammillatis, (castaneis).

The description of this description is derived from two specimens of entire fruit-bearing spadices.

Spadix about six feet long, tapered at the end into a flagellus. *Peduncle* short, compressed, armed on the edges and lower face with unequal, straight, subulate spines and prickles, those of the edges being the longest, otherwise in the parts not covered by the spathes it is unarmed.

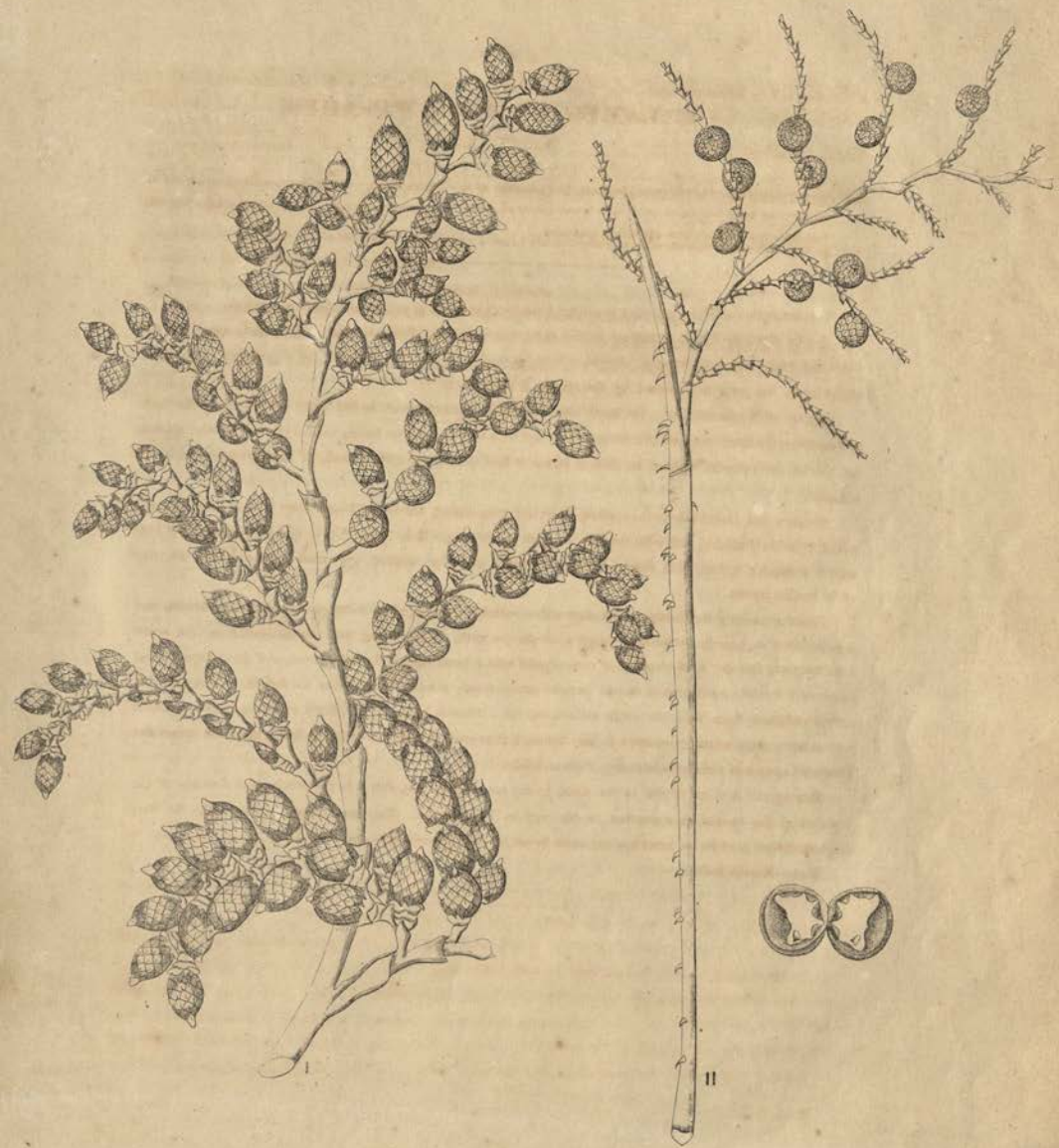
Spathes with obsolete limbs, the lowest about a span long, compressed, keeled along the centre of the back and excepting the short erect half lanceolate limb, armed with straight prickles having conical bases. The other spathes are shorter, more clavate, without an obvious carina or keel and only slightly armed, or as the uppermost, quite unarmed.

Branches just exserted from the spathes, a foot or a span distant, the lowest being about a span long, decompound. Spathes sheathing, rather lax, smooth, the lowest about an inch long. Lower divisions compound, with several spreading spikes, with similar but much smaller sheathing spathes, uppermost internode often abortive as in certain grasses.

Fruits apparently terminating short stout stalks, suffulted or propped by three annular amplectent bracts, and surrounded at the base by the spreading portion of the perianth, elliptic-oblong, with the mammilliform apex seven lines long, and four broad, of chestnut colour. *Scales* with a broad shallow central furrow, and dark edges. *Seed* (apparently berried), erect, convex on one face and conspicuously areolate with foveolæ, on the other convex, with a central umbilicus, from which the areolæ seem to radiate. *Albumen* horny, cartilaginous, on a long section reniform with as many stout entering processes as join areolæ, that proceeding from the umbilicus being much the largest and filled with a mass of cellular substance. *Embryo* basilar.

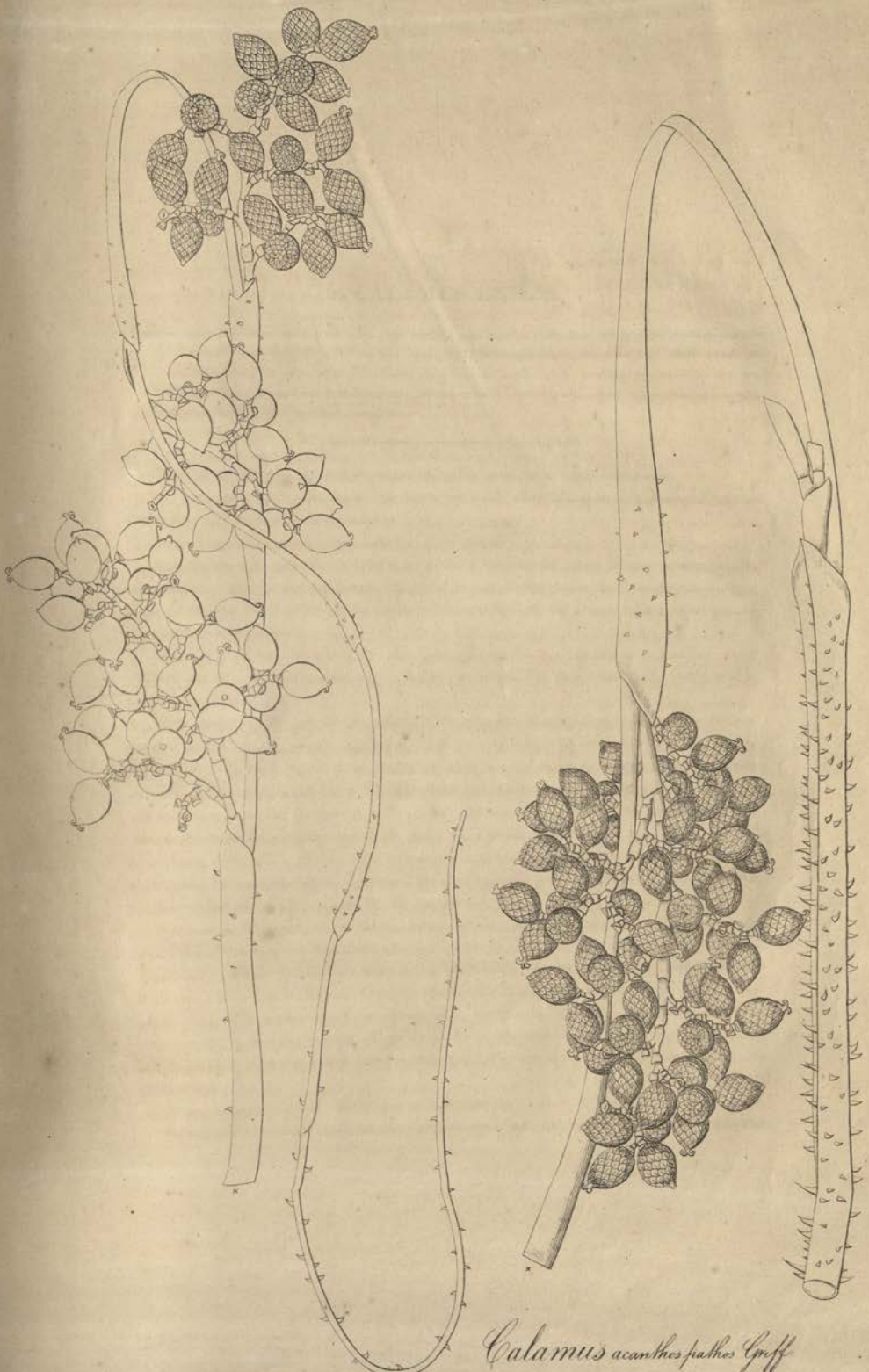
This species does not appear to me allied to any other I have met with. In the division and direction of the branches of the spadix, it appoaches to the section *Pipsospathæ*. This peculiarity together with the very frequent conical prickles on lower spathes, seem to me its chief characteristics.

HAB.—Khasya Hills.



I. *Calamus acanthospathus*, Griff.

II. *Calamus fasciculatus*, Roxb.



Calamus acanthes spathes Griff

10. CALAMUS EXILIS.

Vaginarum aculeis irregularibus sparsis, petioli partis nudæ marginalibus et dorsalibus subsimilibus, partis pinniferæ dorsalibus uncinatis pinnis æquidistantibus linearibus (long. 6-7 unc. lat. 4 lineal), venis tribus utrinque setigeris, spadice 3-4 pedali, flagello excepto subinermi, ramis decompositis, spatha infima ancipito-aculeata præsertim secus margines, reliquis irregulariter aculeolatis. Corolla fl. fæm. calycis longitudine fructibus oblongis stipitatis cuspidatis, fuscescenti-brunneis, seminibus oblongis sulcatis, sulcis e chalaza depressa versus embryonam pseudo centralem arcuatim convergentibus.

The following description of this species is derived from the upper part of a fruit-bearing stem.

It is a very slender species, the *stem* without sheaths being only about the thickness of a goose quill, with the sheaths three and a half to four lines in diameter.

Sheaths armed with scattered unequal somewhat hooked prickles.

Leaves about two feet in length: the lower naked portion of the *petiole* being about six or seven inches long, flat convex and armed along the back and margins with similar, but more hooked prickles, the lower marginal ones being longer and straighter than the others; in the pinniferous part, it is furnished with a row of solitary hooked prickles along the centre of the dorsum.

Pinnules or *leaflets* equidistant, linear, very narrow, six or seven inches long, four lines wide, acuminate; above, with three ribs or keels, bearing a few stoutish bristles; underneath with three veins bearing smaller bristles, margins and apex bristly.

Spadix three or four feet long. *Flagelli* or *thongs* of the upper undeveloped spadices, three feet long. *Peduncle* adnate to the next sheath high up, as high indeed as the puckered base of the petiole, the free portion appears, to be very short; the remaining part except the flagellus, which is very slender, is unarmed. The lowest *spathe* arises close to the base of the peduncle, is four or five inches long, compressed, with a few prickles here and there, and rather long ones along the margin; mouth obliquely truncate. The remaining spathes smaller; not compressed, almost fistulous, and armed towards the mouth with a few small prickles.

Branches of the spadix three or four in number, adnate to the peduncle to an inch or more above the mouth of the spathes, lower divisions three to five-flowered, the upper 1-flowered, covered with cylindrical truncate spathes. The inner *bracteole* cup-shaped, with a cartilaginous callous on one side.

Fruit spreading oblong, attenuate at the base into a short stalk, concealed in the cylindrical broad-based trifid *Calyx*, with which is a *Corolla* of about the same length, divided to the middle into three, erect, now more or less split segments, and six *stamens* without anthers, united as usual to the corolla. The apex is cuspidate by the persistent base of the style. *Scales* of moderate size, of the larger, there are about eight rows, fuscescent with brown margins and points. *Seed* erect, *tegument* greenish baccate viscous, oblong, the lower half is furnished with a longitudinal very deep furrow, *(the fasciculus)* reaching to about the middle on both sides: on one side it ends, is a depression *(the chalaza)* from which several curved lines pass, converging to the centre of the opposite face, at which is the site of the embryo.

Albumen horny not ruminate. *Embryo* near the base, transverse.

The structure of the seed is unlike that of any others known to me. Although the embryo seems central when

the surface is viewed. A longitudinal section shews that the excavation occupied by the funiculus reaches close to it, so that it becomes sub-basilar. The appearance of its being central is due to the growth of the albumen downwards on either side of the hilum. The raphe correspondingly becomes very incomplete. See Tab. CLXXXVI. A. Fig. IV. *a* dors. *b* ventr. *c* longit. Also Martius. Palm. t. 116. f. xii. 3, 4.

Hab.—Malacca Goonong Ladang, obtained by E. Fernandez. Malayan name *Rotang Gonoon.*

Obs.—This species will range near *C. acanthospathus.* It is not improbable I think that it may prove to be identical with *C. melanoloma* Martius, Palm. p. 207. t. 116. f. 3. which is described as having flagelliferous petioles, pinnæ with five veins, on either side bearing bristles, and simple spikes. This last may arise from his specimen having been one of the terminal spadix. The appearance of the flagellus in Martius' Plate, *(Palm. fig. cit.)* is quite that of a flagellus of the spadix. The description of the flowers etc. answers almost exactly. *Palmijuncus equestrius, Hb. Amb. p.* 110. *t.* 56. gives a fair idea of its inflorescence.

11. CALAMUS ROYLEANUS.

TAB. CXCI.

Vaginarum spinis solitariis compressis petiolorum superioribus uncinatis, planis æquidistantibus linearibus angustissimis (long. 10-11 uncialibus latitudine uncialibus), superne carinis 3 longe setosis, spadice nutante aculeato, spathis parce armatis, corolla calycem subæquante, fructibus pisiformibus cuspidatis (albis).

This is a small elegant species, forming impenetrable bushes. The parts from which the following description is taken, consist of an entire young mutilated leaf, portions of more perfect leaves, and of a spadix in fruit.

Sheaths bi-auriculate at their mouths, armed with solitary long subulate spines, less flat than usual.

Petiole in the lower part armed with similar but smaller spines, in the pinniferous part these become aculei.

Pinnules or *leaflets* numerous, approximated, often nearly opposite, linear, acute, ten or eleven inches long by half an inch broad, above tricarinate, the carinæ or ribs bearing distant long bristles; margins with frequent, short, appressed, bristly teeth.

Spadix nodding or pendulous? plano-convex where not concealed by the long, tubular, limbless, slightly armed spathes; convex face armed with solitary prickles. *Branches* a span or foot distant, about a span long, and expanded, owing to the very spreading nature of the spikes. Spaces between these covered with lax, truncate, sub-mucronate smooth spathes. From above the spex of these, arise the spikes, which are rather slender, two or three inches long, and loaded with fruit.

Fruit (immature) ovate-roundish, about the size of a large pea with a distinct cuspis: scales white, rather large, with an indistinct central furrow, paler margins and brown points; each is suffulted by a minute scale-shaped bract and two minute bracteoles, of which the inner is the larger, and by the *calyx*. The *calyx* has a short cylindrical solid base, divided to the middle into three oblong segments. The *corolla* consists of three lanceolate segments, equal in length to the calyx; *stamens* six.

I am in considerable doubt regarding this species, which is that alluded to by Dr. Royle, as agreeing with Roxburgh's *C. Rotang. Illustr. p.* 396. But it differs from Roxburgh's drawing of that species, 1st in the arming of the petioles and sheaths, 2nd in the spines being solitary and long, and not mere aculei or prickles, 3rdly in the shape of the leaves, which are more linear, 4thly in the corolla, which appears to be of the same length as the calyx, and lastly in the fruit which is pisiform, and not ovate.

It cannot be referred to *C. Pseudo-Rotang* of Martius,* because that is described as having the sheaths and

* *Pseudo-Rotang.* Aculeis vaginarum et petiolorum albido-tomentosorum subulatis rectis, pinnis lineari-lanceolatis fasciculato-aggregatis, spathis aculeis reduncis armatis, baccis pisiformibus apice breviter rostratis. (Character e MARTIO).

C. Pseudo-Rotang. *Mart. Palmæ p.* 209. *t.* 116. *f.* 6.

HAB.—Throughout India in wooded places.

MARTIUS, whose description I subjoin, states that this differs chiefly from *C. Rotang* by the broader fasciculate pinnæ, the whitish tomentum of the petiole, and the straight aculei half an inch or an inch long, spread or recurved, and the smaller, globose, shortly beaked fruits. It agrees in armature and fruit with *C. Royleanus*, from which it differs chiefly in the fasciculate pinnæ, and the tomentose petioles. This last character however is (perhaps) a doubtful one, and dependent on the degree of exposure of the part, to external agencies. I am moreover in possession of a specimen I believe from Assam, which I am disposed to consider ROXBURGH's *C. Rotang*, in which, the younger petioles, and especially the sheaths, are covered with a brown tomentum.

petioles covered with white tomentum, fasciculate pinnæ, and spathes armed with hooked spines. In fruit it appears to be similar.

Under these circumstances, I have considered the species a distinct one. It is I believe the only species that extends so far north as to come within the limits of the Seharunpore and Dhoon Flora, and I have therefore dedicated it to a well known investigator of that region.*

HAB.—In the denser, moister parts of the jungles of Dehra Dhoon, chiefly towards the eastern extremity of the valley, as at Kurruck.

"Calamus Pseudo Rotang: *caudice scandente; frondium cirrosarum pinnis lineari-lanceolatis, fasciculato-aggregatis, aculeis vaginarum rhachiumque albido-tomentosarum subulatis rectis spatharum lororumque reduncis; spadicibus composito-ramosis, abortivis loriformibus; baccis globosis (magnitudine Pisi).*

Differt a Calamo Rotang præsertim pinnis fasciculatis latioribus, rhacheos tomento albido-fuscidulo et aculeis rectis (unguem ad policem longis) patentibus vel reversis, baccis minoribus globosis, apice breviter rostratis. Squamæ bacearum testaceo-lutescentes, imo margine exarido ferrugineæ. Nucleus fere dimidiato-globosus, hinc convexus, leviter gyroso-tuberculatus, inde planiusculus atque in arcolam profunde depressus Embryo basilaris, Albumen cartilagineum æquabile.

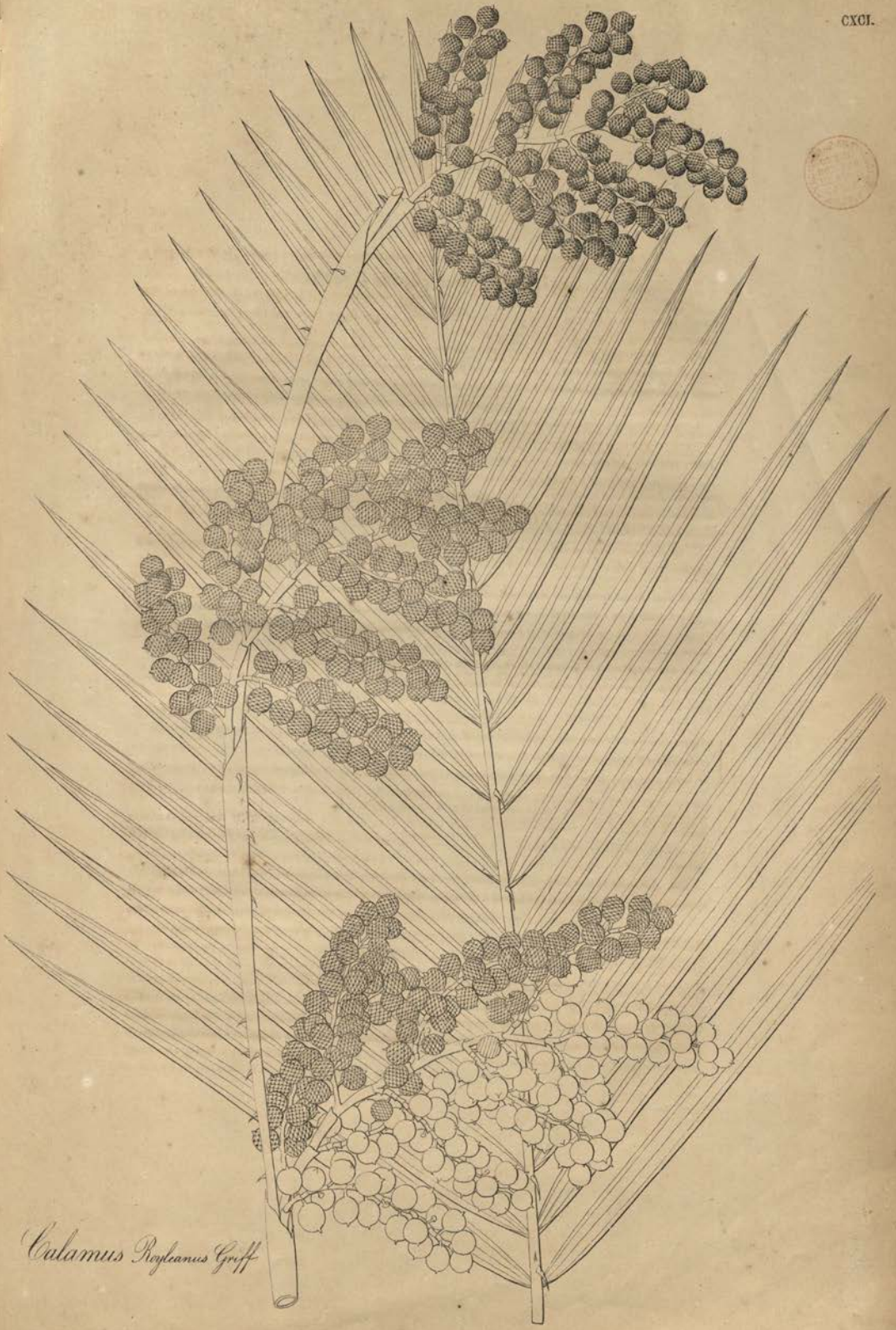
Crescit per vastam Indiæ orientalis plagam, locis sylvestribus e. gr. in Coromandelia: ad Moalmyne in Martabania, ad fluvium Iravaddi prope rupes Pingyi in Pegu." MARTIUS.

* I add Dr. MARTIUS' character, etc. of another Indian species of this intricate part of the genus.

"Calamus Gurubs, HAMILTON: *caudice scandente; frondium cirrosarum pinnis æquidistantibus concinnis linearibus acutis, rhachibus ferrugineo-villosis, aculeis rhachium spadicumque masculorum decompositorum reduncis, calycibus campanulatis trifidis, quam petala lanceolata duplo brevioribus; loris ?— ; baccis— ?*

Species præcedenti et *C. Rotang* præ aliis affinis, sed villo rhachium et floribus minoribus facile distinctu.

Prope Jelpigori in Indiæ provincia Rungpore, lat. bor. 26° 30', *Aprili* 1809, *detexit Cl.* HAMILTON." *Mart. Palm.* p. 211.



Calamus Royleanus Griff

12. CALAMUS ROXBURGHII.*

TAB. CXCII.

C. Rotang. *Roxburgh. Fl. Ind.* 3. *p.* 777. *Icones.* 14. *t.* 28.

Vaginarum petiolorumque glabrorum aculeis parvis solitariis sparsis, petioli faciei inferioris uncinatis, pinnis æquidistantibus lineari-lanceolatis spadice basi et flagello excepto inermi nutante, spatha infima parce aculeata, corolla calycem duplo superante, stylis sub-clavatis, fructibus oblongo-ovatis apice in cuspidem attenuatis (albis). *Char. ex. Icone. Roxb. citata.*

The following is Roxburgh's description of this species. *Root* fibrous. *Stem* jointed, climbing to a vast extent, enveloped in the thorny sheaths of the leaves; with them it is about as thick as a man's little finger; when they are removed, it is in thickness, and every other respect, a common ratan.

* None of the synonyms usually assigned to this species appear to have sufficient reference to it. Thus *Calamus, petræus* LOUREIRO is considered by MARTIUS to be a distinct species: *Tejeru Tejurel* of RHEEDE is the *C. gracilis* of ROXBURGH. *Palmijuncus calapparius* RUMPH. is the *Calamus calapharius* of MARTIUS; and the *Phæniscorpiurus*, etc. of PLUKENET, is referred by HAMILTON to his *C. Heliotropium.* The figures of RHEEDE *Hort. Malab.* 12. *t.* 64. 65. and PLUKENET, *Alm. t.* 106. *f.* 1. 2. Hb. *Amb. V. p.* 98. *t.* 51. which represent two distinct species, have been always referred, except by MARTIUS, to *C. Rotang*, a species founded on the *Palmijuncus calapharius of* RUMPH. (now, *Calamus calapharius*, MARTIUS). It is therefore perhaps advisable to abolish the name *C. Rotang*, (which is besides, a generic, not a specific name), and the whole of the synonymy given by WILLDENOW and succeeding authors.

The Synonymy given by Dr. MARTIUS, *Palmæ.* 209, is perhaps only correct in the citation of LAMARK's figure, (t. 770 f. 1.) referred by LAMARK to LOUREIRO's *C. scipionum.* For PLUKENET's figures is cited by HAMILTON under his C. *Heliotropium*, and ROXBURGH's drawing represents the fruit of his *C. Rotang* to be oblong-ovate, and white, not round, with chestnut-coloured scales as MARTIUS, *Op. cit. lob. cit. t.* 116. *f.* viii, describes it. This same drawing does not agree in the spathes with LAMARK's figure, sufficiently well to convince me of their representing the same species.

It is to be regretted that ROXBURGH quotted WILLDENOW as the authority for this species, his definition not being in any way applicable to it, and being evidently drawn up from *Palmijuncus calapharius* of RUMPHIUS, none of whose figures would Dr. ROXBURGH quote. Of the *Hb. Amboinense*, the only figures that resemble the species under consideration are t. 53 (*Palmijuncus albus*), which however is not of this section, and especially *t.* 55. *f.* 2, *A. B.* (*Palmijuncus viminalis*), which is of this section.

LINNÆUS' *Calamus Rotang. Syst. Plant* 3*rd ed.* 1. 463, is a collection of all the species then known: the real *Rotang* is founded on the plant of BURMAN, *Zeyl.* 36. *Fl. Zeyl.* 468. PLUKENET, *Almag.* 53. PISO, *Mant.* 188. BAUHIN *Pin.* 405, and *Tejeru tejurel* of RHEEDE, *Hort. Malib.* 12. 1211. 64. 65. So that it includes at least two species. Seven of the eight varieties founded on RUMPHIUS' plants are now referred to as many species, and the eighth belongs the *Zalacca.*

WILLDENOW's *C. Rotang* is much the same as that of LINNÆUS, but not so accurately defined, since it includes RUMPHIUS' *Palmijuncus calapharius*, from which indeed he seems to have drawn his characters; although nothing can be more distinct than its figure, from those of RHEEDE and PLUKENET.

Palmijuncus verus, Draco, niger, viminalis, and *albus, equestris* are made so many species of *Calamus*, but WILLDENOW expresses doubt as to their authenticity, and in a *note* says he has rejected, from their insufficient, marks *C. scripionem, amarum*, and *dioicum* of LOUREIRO, though he quotes his *C. petræus* without doubt under *C. Rotang.*

In *Rees' Cyclop*, POIRETS authority is adopted. His chief change is the substitution of *C. petræus* LOUR. for *Rotang* of LINNÆUS and WILLDENOW (to this he quotes *Tejera tejurel* and *C. calapharius*), and the adoption of LOUREIRO's *C. scipionem, amarus, dioicus C. secundiflores.* SCHULTES *Syst. Veg.* 8 *p.* 13, 22, frames his character of this species from RUMPHIUS Palm. *calapharius*, he quotes WILLDENOW and LOUREIRO *C. petræus* for the same. In a note he states that *P. calapharius* alone refers here, he doubts *C. petræus* and states that RHEEDE's plant certainly differs from *calapharius* of RUMPH. The synonyms of BURMAN, PLUKENET and PISO, he regards as doubtful. In all which I take him to be right, so that it is a pity perhaps DR. MARTIUS did not adopt *C. Rotang* for his *C calapharius.*

Leaves pinnate, from eighteen to thirty-six inches long.

Leaflets opposite or alternate, sessile, linear-lanceolate, armed in the margins with minute bristles pointing forward, and a few distinct, long, erect bristles on the upper surface, from six to twelve inches long.

Sheaths cylindric, armed with numerous, strong, straight, compressed thorns.

Petiole sheathing the leaflet-bearing portion compressed, channelled, and armed with both straight and recurved thorns on the under side.

Flagelli, one from the sheath of each leaf near its mouth, they are very long, slender, drooping or waving, and well armed, resembling the slender lash of a whip. Many of Rumphius' figures of these plants have such, terminating the rib or rachis of the leaves.

MALE. *Calyx* universal; *spathe* none; partial many scattered. *Spadix* supra-decompound, drooping, being the above-mentioned flagellus much enlarged, with numerous, partial, truncate spathes, with alternate, decompound, bifarious, recurved spikes therefrom, the ramifications thereof recurved, bearing in two rows on their convex sides, numerous minute greenish flowers. *Perianth* 3-parted, smaller than the corolla, permanent. *Corolla* 1-petalled. *Tube* imperforated. *Border* 3-parted; divisions oval, permanent. *Filaments* six, thick at the base, tapering, nearly as long as the corolla and inserted on the mouth of its tube. *Anthers* incumbent. *Germ* none, but there is the rudiment of a 3-cleft stigma.

FEMALE. *Sheaths* as in the male. *Spadix* decompound, *perianth* and *corolla* as in the male. *Filaments* six, united at the base round the germ. *Anthers* arrow-shaped, abortive. *Germ* round. *Style* short, 3-cleft, divisions or stigmas recurved. *Berries* round, of the size of a small gooseberry, imbricated backward with barky scales, 1-celled, 1-seeded; between the bark and the seed there is a considerable portion of whitish juicy pulp, of a sharp acid taste. *Seed* solitary, marked with many irregular depressions and elevations, and on one side there is a large, deep, roundish pit, a little below it near the base is lodged the monocotyledonous embryo. *Roxburgh.*

HAB.—Bengal and the Coromandel Coast: flowers during the rains; fruit ripens during the cold season; *Roxburgh.*

"Sanscrit *Vetro, vetus.* Bengal *Bet*, or *Sanchi-bet.*"

OBS.—Major Jenkins of Assam favoured me with fruit specimens, at first mixed with those of *C. Mastersianus*, but subsequently separate under the name Jattee, or the common Bet, stating that he fears I had mistaken the fruit of the one for the other.

The branches of the spadix in fruit are 10 or 12 inches long, the internodes are concealed by tubular truncate spathes.

The *spikes* inserted a little above the orifices of these, recurved, simple 1½ to 3, inches long. A minute bract, and two annular bracteoles under each fruit without any carina or scar of a fallen flower.

Fruit at the base presenting the calyx trifid to the middle, below which it is cylindric, the *corolla* equal to the *calyx*, rendered mammillately apiculate by the base of the style, sub-elliptical, about 5 lines long by 3½ broad, covered with large whitish scales, having a dark brown intro-marginal line and denticulate points.

Seed solitary baccate, as in *C. Mastersianus*, but larger, transverse section quite reniform.

This I have little doubt is the fruit of *C. Roxburghii*, (C. Rotang of Roxb.) Its most obvious distinctions from the *Soondee bet*, (*C. Mastersianus*) are in the size and colour, of the fruit, which in the latter has broad brownish lines, so as to look checquered with brown. The spikes and the branches too, are different.

Calamus Rotang Roxb.

13. CALAMUS TENUIS.

TABS. CXCIII. A.B.C.

C. tenuis *Roxb. Fl. Ind.* 3. *p.* 780. *Icones. Suppt. 5. t.* 18.—*Mart. Palm. p.* 212.

Vaginarum aculeis solitariis paucis rectiusculis, petioli (pinniferi) anguli superioris rectis faciei inferæ uncinatis, pinnis æquidistantibus linearilanceolatis (long. pedalibus lat. 7-8 linealibus) supra nitentibus tricarinatis (carinis setigeris) subtus secus venam centralem setulosis, spadice nutante spathisque primariis parce aculeatis, spicis bifariis recurvato-patentibus sæpius simplicibus floribus binatis altero superoque pedicellato masculo, altero sessili fœmineo, calyce urceolato breviter tridentato, stylis sub-ternis filiformibus longis patenti-revolutis.

Roxburgh says, "it is beautiful delicate species; when divested of the sheaths of the leaves and cleaned, it is not thicker than a common quill, and of the colour of the common ratan. Flowering time, the rainy season.

"*Stems* simple, perennial, climbing to a great extent; the extremities inserted in the armed sheaths of the leaves, including these, it is scarcely so thick as a common ratan.

Leaves oblong, equally pinnate, nearly two feet long. *Leaflets* from twenty to thirty on each side, equidistant, alternate, linear, polished, three-nerved; *margins*, *apices*, and *nerves* bristly; six inches long, and scarcely half an inch broad at the broadest part. *Petioles* armed. *Flagelli* from the sheaths, simple, armed, as in the other species.

Spathes numerous, sheathing, sub-cylindric, one for each division of the spadix, even to the pairs of flowers.

Spadices occupy the place of the flagelli on a few of the spathes, decompound; primary branches, four, five, or six, remote, flexuose, with about half a dozen alternate, recurvate branches on each side. *Hermaphrodite* and *female flowers* in alternate pairs, the latter short-pedicelled.

MALE. *Calyx* shorter than the corolla, unequally 2-3-toothed, corolla supported on a fleshy gibbous receptacle, border 2 or 3-cleft. *Filaments* four, five, or six. *Anthers* sagittate.

HERMAPHRODITE. *Calyx* and *corolla* equal, gibbous, with a contracted 3-toothed mouth. *Filaments* six, united in a ring round the lower half of the germ; *anthers* sagittate, large, and seemingly fertile. *Germ* ovate, 1-celled, containing three seeds attached to the bottom of the cell. *Style* scarcely any; *stigma* 3-cleft; *segments* rugose and recurvate." *Roxburgh.*

HAB.—Eastern Bengal as at Sillet; Assam, where it is known as the "Bet" proper. Major Jenkins. Bandharibet of Chittagong. *Roxburgh.*

I here subjoin my own description of the leaves and inflorescence of this species, from specimens communicated by Major Jenkins.

Petiole in the pinniferous part, having the upper angle armed with straight conical subulate prickles, together with the usual row of hooked prickles along the centre of the under face, and similar ones about the margins, often close to the *pinnules* or *leaflets*; towards the apex it only presents the under central series. *Pinnules* or *leaflets* alternate, equidistant, linear lanceolate, acuminate, ten or twelve inches long, seven or eight lines broad, above with three carinæ or ribs bearing long bristles; underneath with shorter bristles along the mid vein; margins setoso-serrulate.

The *spadix* is of considerable length. *Branches* just supra-axillary, very flexuose, and about a span distant; spaces between covered, (except perhaps the lower two inches), by the tubular *spathes*, which are green, and armed toward the upper ends with scattered curved prickles. The upper spathes appear to be the most armed. The naked parts of the

spadix also armed on one face with stout hooked prickles. The spathes (of the spikes), are rather laxly sheathing, sub-truncate, sprinkled with brown scurf, margins ciliate. *Spikes* also supra-axillary, bifarious, about two inches long, recurved spreading, also scurfy.

Flowers distichous on the outside, on the inside tetrastichous, in pairs, the larger conical, sessile, the FEMALE being the smaller, ovately oblong, shortly stalked: the MALE, always on the upper or posterior side of the spike. *Bracts* like the spathes of the spikes, but less ciliate. *Bracteoles* two, broad, the inner one on the inner side is bicarinate and emarginate, and the male flower corresponds to the centre, being adnate as it were to its base.

Calyx of the female thickened at its base, whence its conical shape, in both sexes it is suburceolate with three short teeth, often divided to the middle.

Corolla slightly longer than the calyx, divided below the middle into three erect, oblong, lanceolate segments.

Stamens as usual adnate to the corolla, then monadelphous; *filaments* (free) short; *anthers* sagittate, those of the female flower are effete. The *Ovarium* is as long as the corolla, oblong, rather attenuate to the base, where it is 3-celled, ovule erect. *Style* composed of three broadish immediately recurved segments, which are papillose in side, and in the bud, lanceolate and erect.

OBS.—As regards the pinnules or leaflets, this species is closely allied to *C. Royleanus* and *Roxburghii*, especially the former. An obvious difference however, exists in the small recurved deflexed spikes of this species. In the pairs of flowers, one hermaphrodite and one male, it appears so far as we know at present, to stand alone. The presence of the male may however, (judging from the similarity of the inner bracteole to those of certain other species, which appear discoid), be expected to occur in other instances. The minute examination of these bracteoles, in order to ascertain whether there is the scar of a fallen flower, becomes therefore necessary. So far as can be judged from Roxburgh's short notice of *C. monoicus*,* it would appear to resemble that species closely.

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* *Calamus monoicus*, scandent. *Leaflets* numerous, alternate, lineari-lanceolate, polished, and bristly; *sheaths* flagelliferous; *stamens* monadelphous.

Native place uncertain. It grows in the Botanic garden to about the size of the common ratan, and differs from it only in being monoicous, the divisions of the corolla being lanceolate, and in the *filaments* being very completely united. Its flowering time, is the rainy season.

It is needless to give a full description of this plant, which is exactly like *C. Rotang*, except in the above-mentioned circumstances.

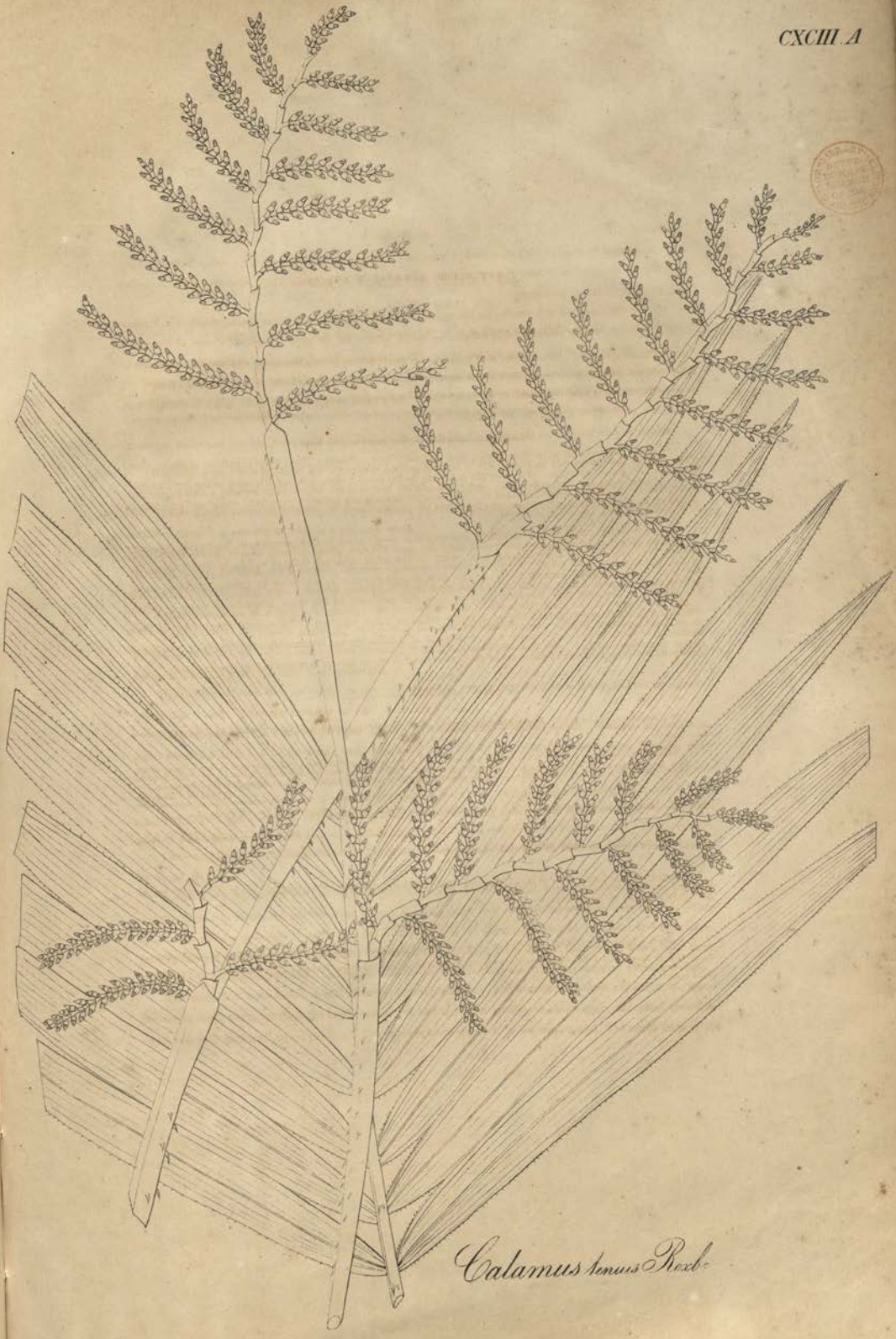
The *male* flowers are about as numerous as the *female* ones, generally one of each proceeds from each of the annular scales of the branches of the spadix. The common ratan (*C. Rotang*) I have always found completely dioicous; this must therefore be considered a distinct species.

C. monoicus. *Roxb. Fl. Ind.* 3. *p.* 783. *Mart. Palm. p.* 209.

I subjoin ROXBURGH'S description of *C. polygamus*, and three of MARTIUS' species, all which appear to me to belong to this part of the Section.

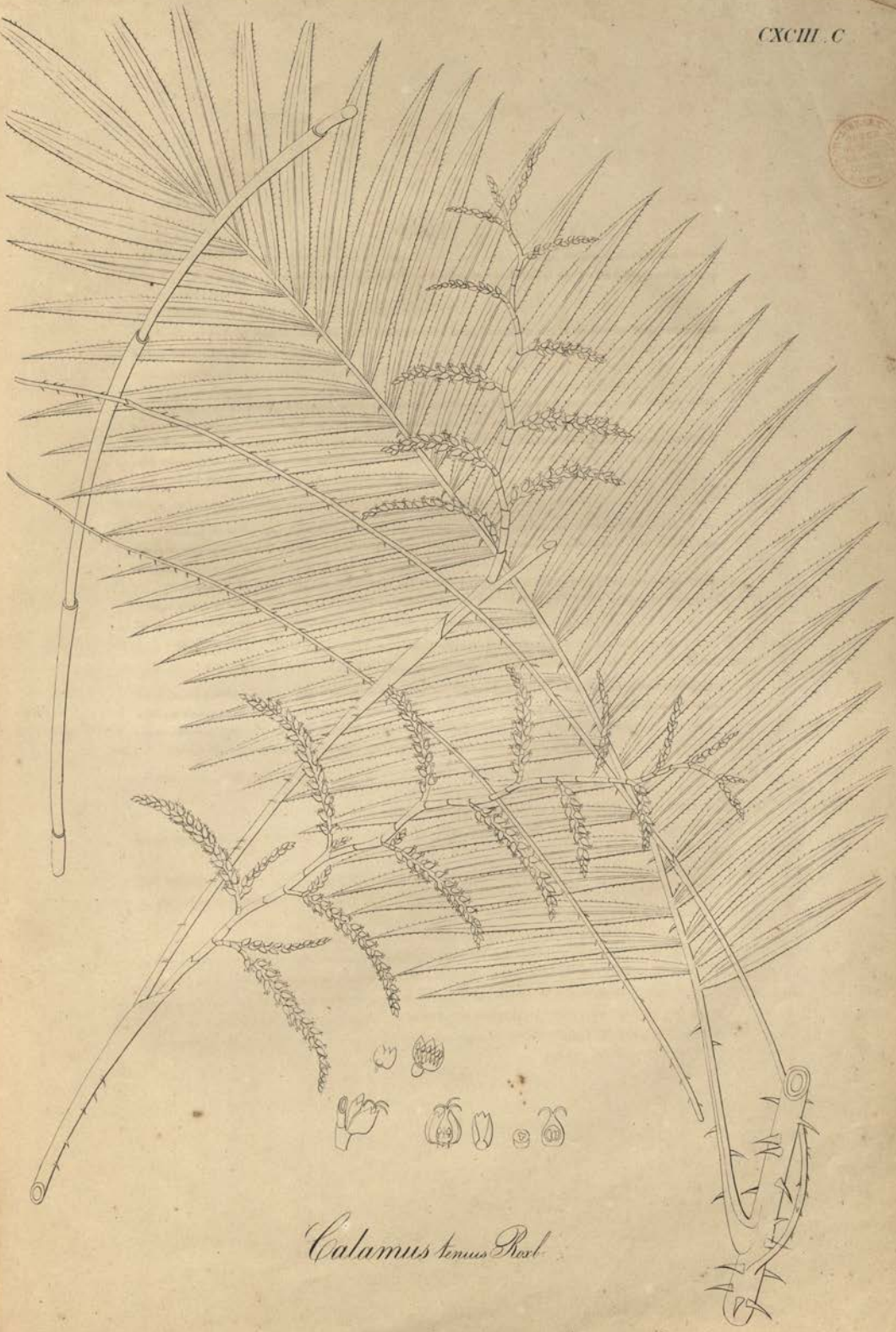
C. POLYGAMUS Roxb.

Scandent. *Spines* sub-verticilled. *Sheaths* flagelliferous. *Inferior leaflets* in remote fascicles of three or four, above single and alternate or opposite, all linear, with a few bristles on the margins and nerves underneath. *Male and hermaphrodite flowers* on the same supra-decompound spadix.



Calamus tenuis Roxb.

Calamus tenuis Roxb.



Calamus tenuis Roxb.

Hoodoom Bet of the people of Chittagong, where it is indigenous, and a most extensive rambler; the general thickness when cleaned is that of a stout walking cane. Its growth is exceeding slow, for in ten years it had acquired a stem of only five feet in length, and the leaves from ten to twelve more.

C. Polygamus, *Roxb. Fl. Ind.* 3. *p.* 780. *Mart. Palm. p.* 210.

It appears to differ from *C. monoicus* in the lower pinnules being fasciculate, and in the flowers being male and hermaphrodite, not male and female.

C. Nitidis Mart.

Caudice; frondibus cirrosis glabris nitidis, pinnis approximatis æquidistantibus lineari-lanceolatis marginatis, aculeis rhacheos recurvis sparsis et confluentibus; spadicibus fœmineis compositis; julis horsum vorsum flexis, baccis (ovato-globosis), squamis fuscis.

Pinnæ spithamam longæ, unguem latæ, firmulæ, venis statu sicco vix conspicuis, setulis non solum in margine latiusculo sed etiam in nervis utriusque faciei. Calamo tenui Roxb. multis modis affinis, sed diversus videtur præsertim sexus distributione.

Crescit in Tenasserim, prope Tavoy. Martius. Palm. p. 211.

C. Concinus Mart.

Frondium rhachi ferrugineo-tomentosa, subtus aculeis rectis reversis, pinnis sub-æquidistantibus concinnis lineari-lanceolatis; spadicis monoici? compositi spathis aculeis rectiusculis reversis; baccis magnitudine pisi minoris, squamis flavidis margine inferiore latius fuscidulo.

Pinnæ, quas vidi, fere sesquipedales, ultra policem latæ. Juli fructiferi bipollicares, non nihil recurvi. In calycum fructiferorum uno eodemque per cujusvis seriei flores latere conspicitur spathella valde contracta, cujus basis cicatricula parva notatur, quam ob causam conjicio, huc flores masculos aut eorum rudimenta in florente spadice excidisse.

Hab.—*Tavoy.* Martius. Palm. p. 208.

C. Melanocanthos Mart.

Caudice scandente; frondibus cirrosis, pinnis æquidistantibus concinnis lineari-lanceolatis acuminatis, margine nervisque tribus primariis setis longiusculis nigricantibus; aculeis cantice nigris, vaginarum subverticillatis rectis, rhachium spadicum compositorum lorerumque recurvis; baccis oblongis octolinearibus, squamis pallide fuscis spadiceo-marginatis.

Crescit in insula Pinang et in ora Tenasserim prope Chappedong: Martius. Palm. p. 211. t. 116. f. 13.

14. CALAMUS LEPTOSPADIX.

TABS. CXCIV. A.B.C.

Spinis petioli (pinnifferi) solitariis uncinatis?, pinnis approximatis æquidistantibus linearibus (long. 10 uncialibus lat. 4-5 linealibus), supra carinis tribus setigeris subtus setulosis secus venam medium, spadicis attenuati aculeati ramis filiformibus, spathis primariis aculeatis secondariis lamina conspicua lanceolata, spicis simplicibus abbreviatis scorpioideis, bracteis apice pennicillatis, floribus oblongis, calyce corolla duplo breviore, fructibus globoso-turbinatis (albis).

The description of this species is derived from the portions of a leaf, and of male spadix in flower, and a female spadix in fruit.

Petiole (in the pinniferous portion) triangular, its under surface rather convex, with scars of solitary spines or prickles, the two side faces are somewhat channelled, and presenting especially towards the insertion of the leaves, dark filamentous tomentum.

Pinnules or *leaflets* many, crowded, regularly alternating, linear, very narrow, ten inches long, four or four-and half lines wide, subulately acuminate, or even perhaps cirrhosely acuminate, the upper face being provided with three bristle-bearing carinæ or ribs, a few smaller bristles on the mid vein underneath: margins rough with very frequent ascending bristles.

MALE. *Spadix* apparently nodding, long, slender, distantly branched, the parts not covered by the spathes frequently armed with short acute stout thorns, solitary, or in clusters of two or three together. *Spathes* very long, narrow, tubular, with rather large lanceolate nearly unarmed limbs. *Branches* of the spadix filiform, a foot long, apparently secund, with frequent alternate, simple, bifarious, short, scorpioid recurved simple spikes, each of which is suffulted or propped by a spathe with a rather large, lanceolate, acute, erect limb. The lowest branch in the specimen is inserted about an inch above the mouth of its spathe.

Spikes about an inch long, nearly twice the length of the limbs of the spathes.

Flowers distichous, oblong, with an amplectent bract having a sub-lanceolate rather long limb, pennicellate at the apex. Inside this bract is a short cup, emarginate behind.

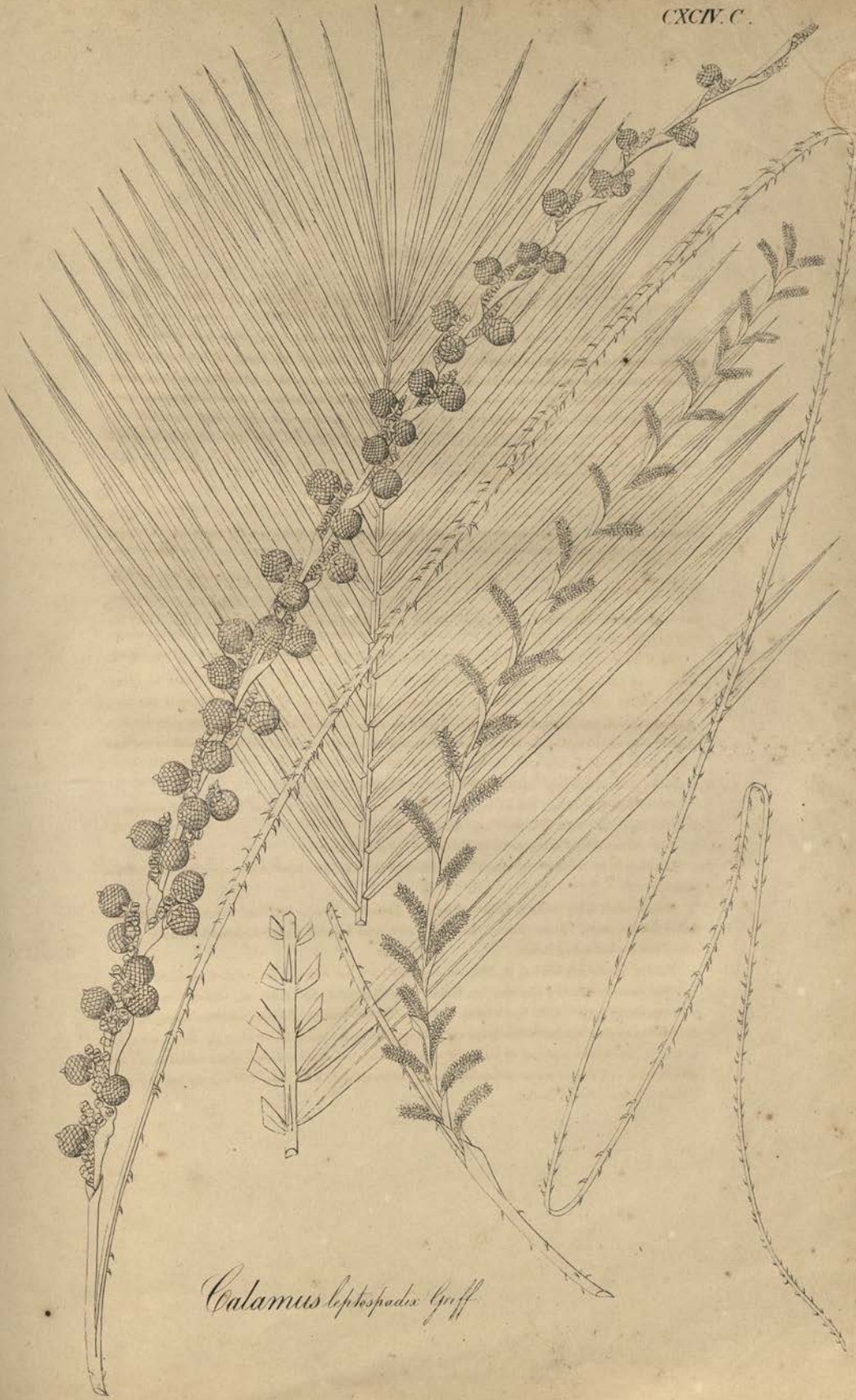
Calyx oblong, divided nearly to the middle in three half-ovate segments.

Corolla twice the length of the calyx, divided nearly to the base, into three oblong-lanceolate rather obtuse segments.

Stamens united to the corolla as far as the base of its segments; *filaments* (free) long, subulate, about one half shorter than the corolla. *Anthers* attached above the middle, linear sagittate, slightly mucronate, versatile. *Pollen* yellow, with one longitudinal furrow.

FEMALE. *Spadix* ends in a long flagellus, armed as usual, the spikes appressed to the filiform branches.

Fruit globosely turbinate, apex cuspidate, looking rather downwards, scales rather lax, whitish, with conspicuous brown magins and points. Its base is surrounded by the flattened perianth, (the calyx with three oblong segments, the corolla with three segments a little longer and narrower), and by two bracteoles, of which the inner bears a disc on one side, and forms a cup; they do not appear to be pennicillate. *Seed* one, roundish, with a foveola on one side. *Albumen* solid, with a pitted areolar surface and a cavity corresponding to the foveola, filled with the tegument which is blackish-brown. *Embryo* basilar.



Calamus leptospadix Griff

HAB.—Khasya Hills, between Nunklow and Naogong, in flower and fruit, November, 1835. *Herb. Assam Deputation.* In the same locality *Areca gracilis*, *Harina caryotoides*, and *Caryota urens* were observed.

The male spadix of this, resembles in some respects that of *C. palustris*.

In the leaves it approaches *C. tenuis*, Roxburgh. It is distinguished from all the others by the long filiform distant branches of the spadix, the lanceolate rather large limbs of the primary, and especially of the secondary spathes, and the pennicillate bracts; the cellular hairs or processes of these bracts, are not altogether unlike the bodies forming the tufts at the end of the leaves in certain mosses.

Plukenet's figure of Phœnicoscorpiurus, *Phytogr. t.* 106. *fig.* 2. resembles this species in many respects.* Hamilton (*Cat. Dried Plants, p.* 90.—*No.* 877.) quotes the same figure for his *C. Heliotropium*, to which I should have referred this, had the relative lengths of the calyx and corolla agreed with Martius' character of that species.

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* "*C. Heliotropium* HAMILTON: *caudice scandente; frondium cirrosarum pinnis æquidistantibus concinnis lineari-lanceolatis acuminatis, aculeis rhachium spatharumque recurvis; spadicibus masculis decompositis, calycibus urceolatis breviter dentatis, petala subæquantibus;—loris ?—; baccis.—*

Frondium forma et verosimiliter caudice affinis est C. Rotang, sed differt spadicum masculorum julis laxioribus, spathellularum apparatu minore, calycibus multo longioribus, ore contracto breviter tridentatis.

In Goyalpara, Indiæ Orientalis, Augusto, 1808, *legit Hamilton*." MARTIUS. Palm p. 211.

15. CALAMUS FASCICULATUS.

TABS. CXCV. A.B. and TAB. CXC. A. Fig. II.

C. fasciculatus. *Roxb. Flor. Ind.* 3. *p.* 779. *Mart. Palm. p.* 209.

Spinis vaginarum et petiolorum albido-furfuraceorum longis rectis subulatis fasciculatis vel solitariis, pinnis egregie fasciculatis subquadrifariis lincaribus (long. 9-10 uncialibus lat. vix uncialibus), marginibus et carina centrali supra spinoso-setigeris subtus venis tribus setulosis et sæpe furfuraceis, spadice aculeato, spathis infimis primariis bicarinatis secus carinas aculeatis superioribus ecarinatis aculeatioribus, spicis compositis, spiculis brevissimis scorpioideis, bracteolis distinctis, corolla calycem triplo superante, stylis clavatis reflexo-patentibus, fructibus oblongo-ovatis breve cuspidatis (albis), albumine æquabili hinc umbilicato.

Stems rather slender, and not very long: sheaths at first covered with white meal, afterwards smoother and green, armed with spreading strong flat spines, solitary, or in short series.

Petioles (pinniferous part) convex trigonal, covered with brownish white meal, as also are the bases of the spines; the under flat face is armed with long flat spreading very sharp spines, generally fascicled, sometimes solitary, upper angle with solitary or binary, similar, but smaller ones.

Pinnules disposed in fascicles or in clusters of three, occasionally four, all slightly arched, convex on the upper face, the lowest of each fascicle ascending patent, and crossing obliquely over the others, so that they are nearly tetrastichous. They are linear, eight or nine inches long, and about one inch broad, the upper surface with one carina, armed, as also are the margins with whitish thorny teeth: mid vein underneath furnished with a few bristles.

MALE *Spadix* several feet long, ending in a long flagellus, aculeate in the part not covered by the spathes.

Lower *spathes* long, compressed, almost two-edged owing to a dorsal and ventral carina, the former armed especially towards the apex, with a few short subulate spines; upper *spathes* without carinæ, armed with many prickles.

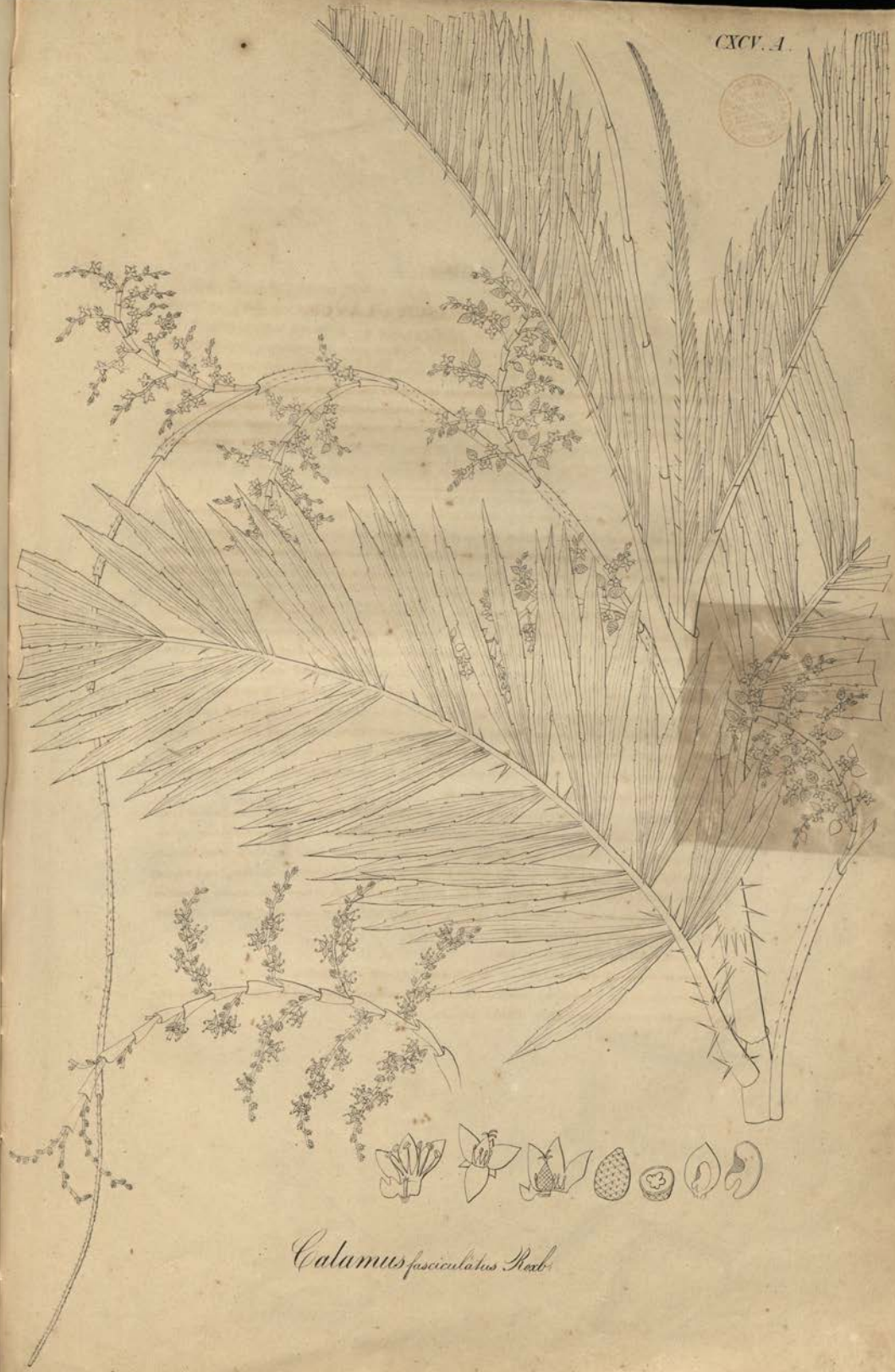
Branches of the spadix adnate to the peduncle as high as the mouths of the spathes, thinly branched, slightly and distantly flexuose, upper half of the internodes covered with spathes having small acute limbs. *Branchlets* bearing the spikes, four or five inches long, generally slightly scorpioid.

Spikes very short, not exceeding half an inch in length, scorpioid, suffulted by broad short spathes, crowded with distichous flowers. Each male *flower* is suffulted by a scale-shaped *bract*, amplectent, with comparatively very spreading oblong ovate limbs. *Bracteoles* small, especially the inner one, not united into a cup! *Calyx* broad, angular, divided to the middle, segments half ovate, slightly keeled. *Corolla* three times the length of the calyx, broad, angular in the bud, divided nearly to the base, segments oblong, spreading. *Stamens* six, as usual united among themselves and to the base of the corolla. *Filaments* (free) subulate, moderately long, anthers rather short, sagittate. Rudiment of the *Pistillum* consists of three small bodies.

FEMALE *spadix* resembles that of the male.

Branches detached from the peduncle some distance above the points of the spathes.

Spikes (simple) 2 or 3 inches long, spreading irregularly, they become detached from the branch just within the half lanceolate points of their spathes. Flowers distichous.



Calamus fasciculatus Roxb.

Calamus fasciculatus Rt.

Bracts amplectent somewhat boat-shaped. The inner bracteole with one side bicarinate and presenting also to scar of a fallen flower.

Fruits surrounded at the base by the flattened Perianth (*Calyx* of three lanceblate sepals, *Corolla* of three rather shorter and smaller petals) at the apex it presents a stout short style, with three recurved branches. Fruit itself turbinate, scales whitish. Seed one, erect, sub-uniform, the sinus being at the base covered with a fleshy tegument of a light reddish colour, with green areolations.

Raphe divided nearly from the base into two white lines, disappearing about the middle of the seed.

Albumen horny, with a cup-shaped depression on the raphal face, the opposite face foveolar. Embryo concealed short, obliquely situated near the base of the seed.

HAB.—Bengal: (common about Calcutta in Bamboo jungles), also at Cuttack, and many other places; Roxburgh says he never saw it to the southward of Ganjam. It is the *Bura-bet* of the Bengalees and grows in small thick bushy tufts.

Flowers during the rains.

OBS.—Of this I have fruit specimens from the eastern parts of Bengal, and from the neighbourhood of the Gardens. These do not correspond with Roxburgh's Drawing either as regards the relative size of the calyx and corolla, or shape of the fruit.

I can see no difference between the specimen from eastern Bengal, and Dr. Martius' figure of *C. extensus*, (*cit. t.* 116. *f. iv.*) which it is to be remarked Martius describes (though Roxburgh gives the leaves only as flagelliferous, as having both the petioles and spadices extended into flagelli, a circumstance I believe not yet observed in the genus).

A fine climbing specimen exists in the Serampore Garden, and has the leaves much longer and narrow than I have elsewhere observed.

This species is easily distinguished from all the others by its habit, by the direction of the pinnules (in which respect it approaches to *Zalacca*), and by their spinous margins and keels. The male spikes are shorter and broader than in any other species I am acquainted with, and in the distinctness of the bracteoles it appears to be singular.

16. CALAMUS GRACILIS.

TAB. CXCVI.

C. gracilis. *Roxburgh. Flor. Ind.* 3. *p.* 781. *Icones Suppt.* 5. *t.* 16. *Mart. Palm p.* 210. Tsjeru-tsjurel. *Rheed. Hort. Mal.* 12. *t.* 64.

Aculeis vaginarum et petiolorum solitariis sparsis, pinnis fasciculatis (fasciculis distantibus ternis subopp-ositis) lanceolatis (long. 3-5 uncialibus lat. subuncialibus) cuspidato-acuminatissimis utrinque triveniis, venis setigeris, spadice subfiliformi spathisque aculeatis, ramis distantibus spicis paucis simplicibus obsolete scorpioideis, corolla calycem triplo excedente.*

"A native of the forests of Chittagong, where Mr. W. Roxburgh found it climbing over trees and bushes to a great extent, and in flower in the month of May. This species is uncommonly slender, when divested of the sheaths of the leaves and dry, scarcely as thick as a common quill, in texture firm and elastic, covered with a smooth, straw-coloured crust as in the common ratan.

Stems simple, perennial, climbing to a great extent; all the tender or younger parts toward their extremities invested in the armed sheaths of the leaves, including these about as thick as a man's little finger.

Leaves alternate recurved interruptedly pinnate, if I may be allowed to call a pinnated leaf so, which is destitute of smaller leaflets, between the principal ones, from one to two feet long.

Leaflets collected in three opposite bundles of from two to four pair each, with much more of the rachis left naked between them than the spaces they occupy, sessile, doubled backwardly at the base, linear-lanceolate, bristly, pointed, both surfaces lucid, three-nerved; nerves on the upper side as well as the margins bristly, from three to five inches long, and less than one inch broad. *Rib* or *rachis* carinated along the upper side, when young covered with ferruginous dust, rounded underneath, and armed with recurved prickles.

Flagelli or *tendrils* issue single as in the other species, from near the mouths of the sheaths of the leaves; they are long, jointed, slender as a pack-thread, drooping, sheathed, armed with numerous, very sharp, recurved prickles.

MALE *Spadix* from the mouths of the sheaths or opposite sides of the flagelli compound, jointed; joints approximate, sheathed; ramifications recurved, bearing two rows of sessile flowers on their convex side.

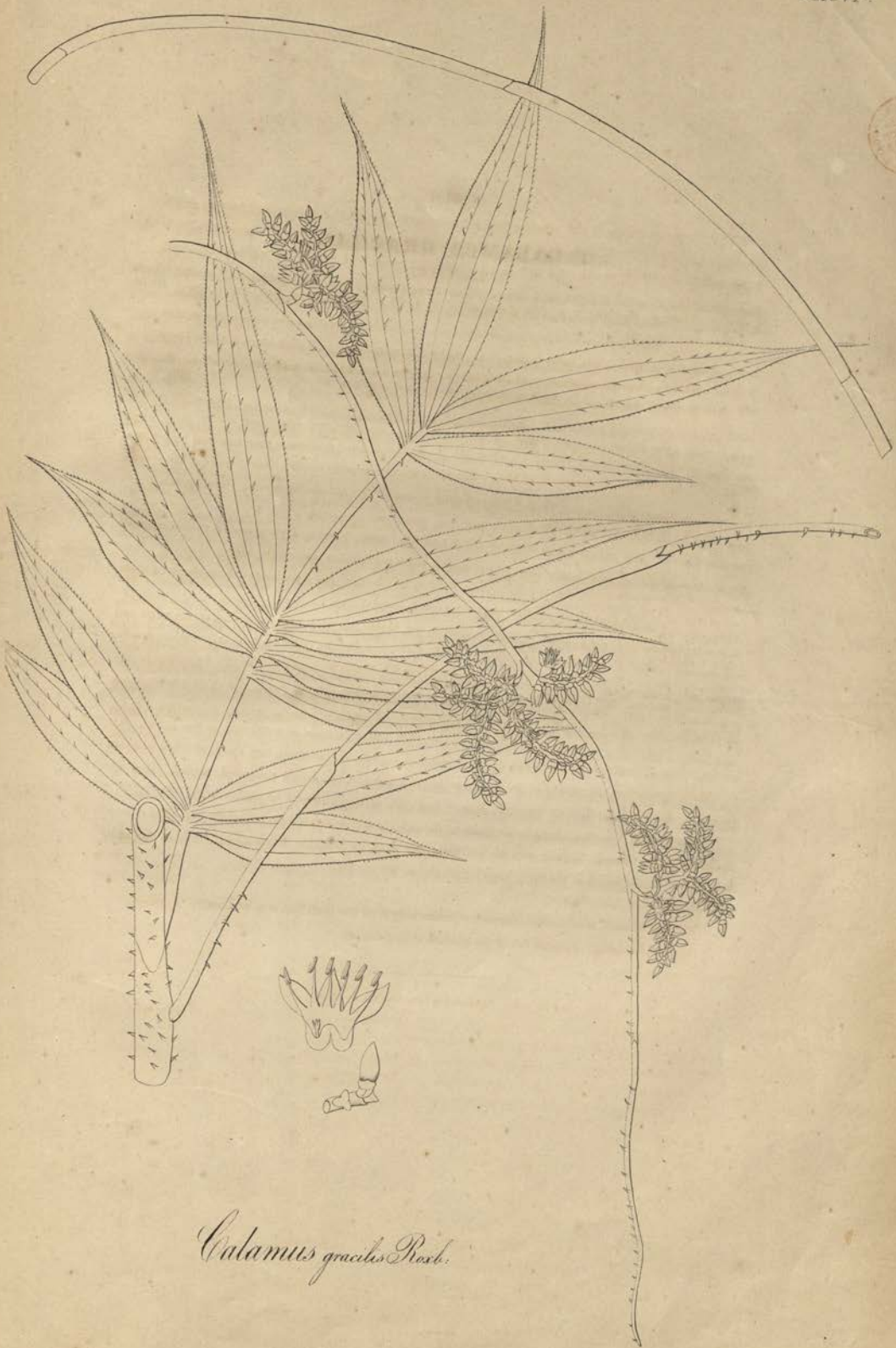
Calyx 1-leaved, tridentate, sitting on the joints of the rachis in a three-toothed cup, which may be called a lower or exterior calyx. *Corolla* 3-parted, with the base fleshy, and partly impervious. *Filaments* six, thick at the base, and inserted on the mouth of the fleshy impervious tube of the corolla.

Anthers linear, incumbent.

Pistillum, a small, three-toothed, abortive, style-like body is all that is all that is to be found." *Roxburgh.*

HAB.—Chittagong. Mapoori Bet of the Hindoos of that district.

* Character ex Icone Roxburghiana citata.



Calamus gracilis Roxb.

17. CALAMUS MISHMEENSIS.

Petiole (pinnifero) spinis solitariis longis uncinatis subtus armato et margine aculeato, pinnis fasciculatis (vel superioribus alternis) linearilanceolatis (long. 15 uncialibus lat. $1\frac{1}{4}$ uncialibus) apice obtusis penicillatis, supra venis 5 setigeris, subtus centrali tantum, spadice aculeato, spatha primaria infima ancipiti secus margines aculeata, spicis simplicibus patentibus, fructibus globosis (albis).

This is a climbing species the description of which is derived from portions of a leaf and spadix in fruit, the latter broken.

Petiole (in the pinniferous part) trigonal, lower face concave, armed along to middle with long hooked spines with here and there, particularly about the margins, short aculei, these gradually disappear towards the apex of the leaf.

Pinnules fasciculate, with solitary ones insterspersed, towards apex distantly alternate, linear lanceolate, fifteen or sixteen inches long, one and a quarter broad, upper face with three keels, which bear bristles of good size; there are also two lateral veins (one on either side) with small bristles; under surface with the mid vein unequally bristly above the middle, margins with spreading pungent bristles, apex obtuse, with the bristles so much developed and crowded as to be nearly pencilled.

Spadix in the exposed parts plano-convex, with strong short hooked thorns on the convex face.

Spathes tubular, lowest compressed, two-edged, with short teeth along the edges, upper ones not compressed, almost unarmed. *Branches* altogether exserted, being attached considerably above the mouths of the spathes, five inches long. *Spikes* simple, stout, 2 or 3 inches in length, arising from a knob just above the points of the narrow spathes, which cover the internodes of the branches, and which have small acuminate limbs.

Fruit subsessile, globose, as usual tribracteolate, surrounded at the base by the flattened *calyx* with oblong-ovate segments, and the *corolla* with ovate-lanceolate segments and 6 sterile *stamens*; scales large white, with a brown margin and point. *Seed* one, dry, deeply pitted, with a deep umbilicus on one side.

This species in the form of the spadix is allied to *C. tenuis*, Roxburgh, but the flowers seem to be dioicous, judging from the remains, neither have the females the same form. The spikes also are rigid, very spreading, without any tendency to be recurved or deflexed. The leaves are widely different, in situation resembling those of *C. fasciculatus* and *gracilis*, to which last it appears to be allied.

Hab.—At the foot of the Mishmee mountains near Tapan Gam's village: in fruit, November 1837.

18. CALAMUS FLORIBUNDUS.*

TAB. CXCVII.

Spinis petioli (pinniferi) aculeatis solitariis longis uncinato-deflexis, pinnis fasciculatis lineari-lanceolatis (long. subpedalibus, lat. 11-12 linealibus) supra carinis 3-5 setigeris, subtus setis paucis secus venam mediam, apice sæpius obtusis vel bifidis, spadice aculeato supra-decomposito, spathis primariis 1-carinatis secus carinam spinis rectis longiusculis armatis cæterum crebre aculeatis secondariis floccoso-ciliatis, corolla calycem duplo excedente, styli ramis lanceolatis.

The description of this species is founded upon a specimen of the upper part of an axis, with the lower part of the base of the petioles, many specimens or portions of leaves, and male and female inflorescences the latter before the expansion of the flowers.

The sheaths are armed with brown deflexed long plano-subulate spines, solitary or in short series, otherwise thickly covered with solitary or seriate brown bristles. The base of the *petiole* appears similarly to be armed, the spines being perhaps confined to the edges; it is in the pinniferous part convex-trigonal, the under face armed with unequal curved deflexed very strong spines (the longest an inch in length or more) also with short scattered prickles. *Pinnules* or *leaflets* fasciculate, with or without solitary ones interspersed, linear-lanceolate, 13 or 14 inches long, 11 or 12 lines broad, upper face with three or even five carinæ or ribs, all bearing bristles, under face with a few bristles on the mid vein towards the apex; margins with ascending stout bristles; apex obtuse, hispid, often bifid.

The *spadix* is rather long, probably nutant, where exposed plano-convex, armed on the convex face with hooked prickles. *Spathes* generally very long with short limbs, irregularly armed with slender straight spines, and with many aculei. The lowest of the spathes sometimes a foot long, bicarinate, one carina running up the centre of the limb; those next to it are similarly 1-carinate; the carina in the uppermost is obsolete. The longer spines are confined to the carinæ. *Branches* distant, supra-decompound, the lowermost deflexed, the upper ones ascending, the internodes are concealed by spathes with truncate margins more or less ciliate, and in the young state especially, they are grey from whitish filamentous hairs. *Brunchlets* which bear the spikes recurved or spreading, with short, acute, often mucronate spathes. *Spikes* attached midway between these, short, scarcely more than half an inch long, subscorpioid.

MALE *flowers* distichous, ovate: suffulted by a small bract likewise ciliate and generally pennicillate at the apex, and also by two *bracteoles* less combined than usual, indeed sometimes nearly distinct. *Calyx* divided to the middle, segments half-ovate. *Corolla* about twice the length of the calyx, divided almost nearly to the base, segments ovate-lanceolate, spreading. *Stamens* as usual united to base of corolla; *filaments* (free) long, subulate, flexuose in the bud;

* C. *pennicillatus*, pinnis æquidistantibus lanceolatis 7-9 venis margine integris (esetosis) apice setoso-pennicillatis.

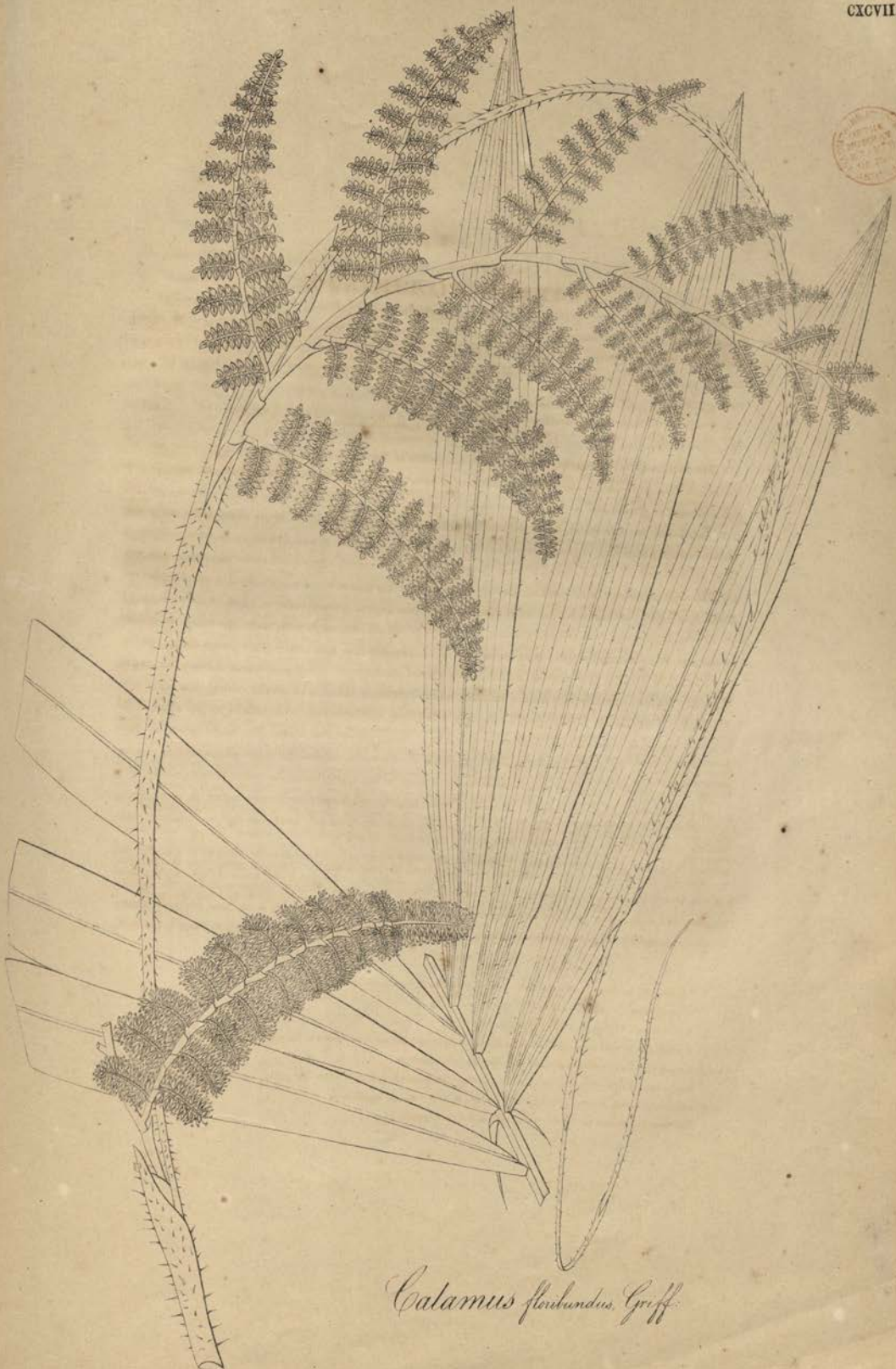
C. pennicillatus. ROXB. *Fl. Ind.* 3. *p.* 781. MART. *Palm.* p. 21.

HAB.—Forests, Pinang MR. WM. ROXBURGH.

I subjoin ROXBURGH's notice of this plant, which in the shape, venation and tufted points of the pinnæ, and especially their entire smooth margins, appears to present sufficient peculiarities to enable it to be identified.

"Scandent. *Leaflets* thirty-four pair, regularly alternate except the terminal two, which are united, lanceolate, seven to nine-nerved-margins entire and smooth, a pencil of bristles from the apex of each. *Sheaths* flagelliferous.

It is more slender than the common ratan, and less so than *C. gracilis*."



Calamus floribundus, Griff.

anthers obtusely sagittate, attached above the middle, versatile. Rudiment of a *pistillum* of three rather small distinct bodies.

FEMALE *flowers* on simply spiked more elongated branches. *Spikes* 2 or 3-inches long, alternate, generally recurved, flexuose, pale ferruginous-tormentose. *flowers* rather distant, suffulted by an amplectent bract with a short acuminate limb, and by two *bracteoles*, of which the inner bears an incomplete disc on one side, and between this and the outer bracteole is a space as though there should be an additional flower. *Calyx* (in bud) ovate-conical, a good deal longer than that of the male flower, divided to the middle. *Corolla* (in bud), length of the calyx, otherwise as in the male, but the segments have thin margins. *Stamens* 6, monadelphous ; *filaments* (free) short, flat ; *anthers* effete. *Ovarium* cylindrical, 3-celled, shorter than the branches of the *style*, which are lanceolate and papillose. *Ovules* 3.

HAB.—Upper Assam, at the mouth of the Nao-Dihing River, and towards Jarhauth. Both Major Jenkins and Mr. Masters have sent specimens to me, so that it appears to be common.

OBS.—This species seems to vary a good deal ; among the specimens from the Nao Dihing, is a portion of a leaf, in which the spines are short, solitary, and the pinnules two feet or more in length by thirteen lines broad, with only one keel on the upper face, and this is the only part besides the margins that bears bristles ; the apex also is often subulate-acuminate.

There were also specimens found among the dried plants of the Botanic Gardens without name, but which are said to have been prepared from plants growing a long time ago in the Gardens ; these, had the petioles been flagelliferous, I should have referred to *C. latifolius*.

The inflorescence varies a good deal as to smoothness ; in some of the more advanced specimens, the margins of the bracts even, are nearly smooth.

It approaches especially by its inflorescence to *C. latifolius*, but that plant has flagelliferous petioles.

19. CALAMUS LATIFOLIUS.

TAB. CXCVIII.

C. latifolius. *Roxb. Fl. Ind.* 3. *p.* 775. *Icones. Suppt.* 5. *t.* 17. *Mart. Palmæ. p.* 208.

Katu-tsjurel. *Hort. Malab.* xii. t. 56. *fid. Roxb. Mart.*

Spinis vaginarum subverticillatis, petiolis aculeatis, pinnis fasciculatis lanceolatis (long. 16-uncialibus lat. 3-uncialibus) 5-7 veniis supra convexis utrinque esetosis, spadice supra-decomposito spathisque aculeatis, corolla calycem triplo excedente.*

"Korak Bet of the natives of Chittagong, where it is indigenous, and runs over trees to an immense length. When freed from the sheaths of the leaves it is about as thick as a slender walking cane. Plants introduced by Mr. W. Roxburgh, in 1801, into the Botanic Garden, flowered for the first time in November and December 1809, when they had attained to the height of about forty feet.

Spines numerous, on the stems sub-verticilled, very large, flat and divaricate. On the flagelli fascicled and recurved.

Leaves alternate, pinnate, from six to twelve feet long including the whip or flagellus, which terminates the common petiole as in many of Rumphius' figures; and the leaf of his *Palmijuncus equestris, vol.* v. *t.* 56. is tolerably like that of my plant, but their size is very different. *Leaves* in seven or eight remote fascicles, of three or four each, broad-lanceolate, very erect, many-nerved, smooth on both sides; with the margins triflingly spinous-dentate, and the upper surface always convex, from ten to eighteen inches long, and from three to six broad.

MALE. *Spadix* supra-decompound; all the divisions bifarious. *Flowers* small, of a greenish yellow colour, each sitting in a cup composed of two concave sheathing bracts. *Calyx* 3-toothed. *Corolla* 3-parted. *Filaments* six, inserted on the imperforated base of the corolla. *Anthers* incumbent. *Pistillum* none, a small 3-lobed gland occupies its place." *Roxburgh.*

OBS.—I have a personal knowledge of this species: it appears to be allied to the succeeding, from which it differs by its fasciculate lanceolate pinnules.

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* Char. ex Icone Roxburghiana citata.

Calamus latifolius Roxb.

20. CALAMUS INSIGNIS.

(N. sp.) aculeis viginarum sparsis conico-subulatis, petiolorum infra pinnas dorsalibus uncinatis intra pinnas supra medium marginalibus superad ditis, pinnis distanter et irregulariter alternis (senis cum terminali æquilaterali profunde biloba) cuneato-lanceolatis vel obovatis subtus concavis glaucis apice obtusiusculo tantum setigeris.

The description of this species is derived from specimens: of an entire upper part of a stem, not in flower. The *stem* is slender, not thicker than a common quill, or including the sheaths, about four lines in diameter. Sheaths about a span long, with a few scattered conical subulate prickles.

Leaves nineteen or twenty inches long.

The *petiole* below the pinnules is about five inches long, roundish, nearly triangular, armed throughout along the centre of the under surface with small hooked prickles, and above the middle of the pinniferous part with similar prickles along the margins.

Pinnules irregularly and distantly alternate, five in number, exclusive of the terminal equilateral and deeply bilobed one, cuneately lanceolate, sessile, distinctly concave, underneath with inflexed margins, glaucous-carinate above, with many parallel veins and transverse venules, and a short obtuse point, which is the only part bearing bristles.

Flagellus united to the sheaths high up, very slender (the longest about a foot long) armed with the ordinary prickles.

This appears to me to be a very distinct species, it may be taken perhaps as a passage to *Ceratolobus*. At first sight it is not altogether unlike *C. gracilis* of Roxburgh.

Hab.—Malacca, where it was found by my collector, E. Fernandez, its Malayan name, is *Rotang Bhattoo*.

21. CALAMUS GEMINIFLORIS.

TAB. CXCIX. A.

(N. sp.) vaginarum (striatarum) aculeis sparsis, petiolorum inferne marginalibus superne dorsalibus, palmatis uncinatis cum vel alisque marginalibus, pinnis æquidistantibus linearibus (long. 8 uncial, lat. 4-5 lineal) supra carina 1 setas validas gerente marginibus integerrimis, spadicibus brevibus nutantibus inermibus spicas 3-4 pendulas gerentibus, floribus geminatis (interdum ternis) fructibus turbinato-rotundatis, squamis frimbriatis (minutis fuscis).

The description of this species is derived from an entire upper part of the plant in fruit.

It is a climber with the apices of the spathe and petiole both prolonged or flagellate. Diameter of the stem with the sheaths six or seven lines.

Sheaths striate, and armed with numerous scattered small irregular prickles, mouths as usual oblique, with an occasional elongated spine or two? The uppermost sheaths, at least of the floral leaves are nearly or quite unarmed.

Petiole pinniferous from the base, throughout the lower part for about a foot, armed with a few marginal straight prickles, *above* along the dorsum with palmate clawed prickles, with or without a few small marginal ones, the former are continued into the flagellus, which is stout and strong.

Pinnules equidistant, but less close than usual, linear, nine or ten inches long, and four or five lines broad, very acuminate, above with a carina bearing a few very stout *bristles*, the under surface and margins except perhaps towards the apex, smooth.

Spadices axillary, nodding, lowermost four or five inches long, bearing four or five pendulous *spikes* six or eight inches long, the uppermost very short, consisting of two similar pendulous spikes. The leaves suffulting the uppermost are reduced to an unarmed sheath and a flagellus! so that the inflorescence becomes almost terminal.

Spathes short tubular, rather shorter than the internodes of the spadix, with obsolete limbs; altogether similar to the secondary spathes of the generality of the species.

Spikes stout, shortly adnate to the peduncle, flexuose, shortly ferruginously pubescent. An amplectent rather large and likewise pubescent *bract* is placed at each flexure, suffulting two, or occasionally three flowers, (equally developed) situated on a short stout stalk, whence the flexures appear thickened, each of which has two *bracteoles*, the inner being nearly annular, the outer very small.

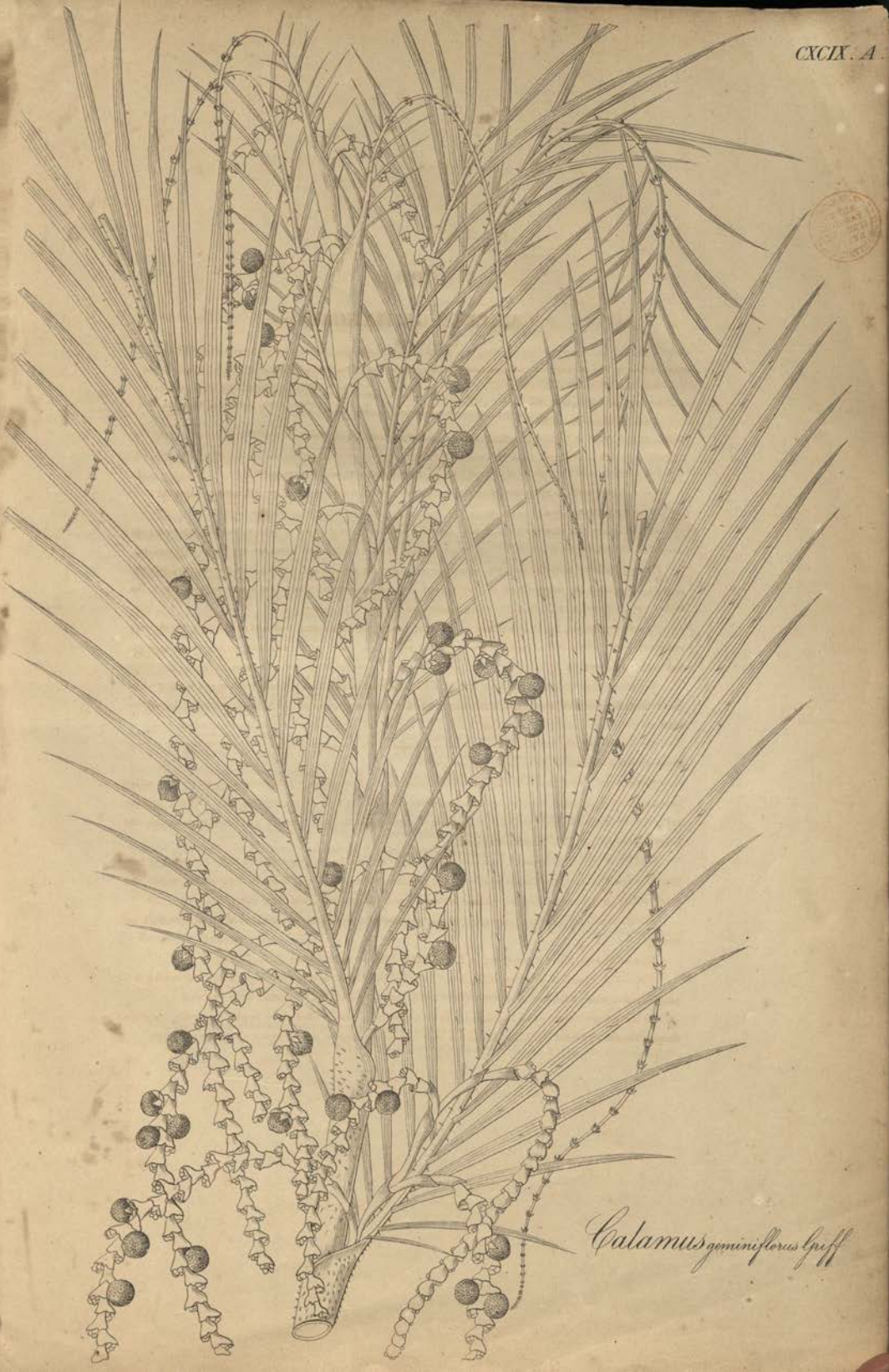
Fruit, (very immature) roundish turbinate, surrounded at the base by the *Calyx*, divided to the cartilaginous base into three roundish lobes, the *Corolla* equally divided into three oblong segments, twice as long as the sepals, and scurfy outside, and six broad *filaments* without anthers, tipped with the remains of three styles.

Scales exceedingly numerous, very small, brown with whitish fimbriate edges, substance of the parietes thick and spongy.

HAB.—Malacca, where it was found by E. Fernandez, Malayan name *Rotang Toongull*.

OBS.—This species in its spikes is allied to *C. ornatus*, but I know no other species in which the spadix is so simple, and in which the upper leaves are reduced to the vagina and flagellus, the former being unarmed.

In this respect it approaches *Eugeissona*. In the character of two, or often three, apparently equally developed flowers it appears to stand alone, and also in the want of predominance of the lowermost spathe over the rest.



Calamus geminiflorus Griff

22. CALAMUS PALUSTRIS.

TAB. CXCIX.

(N. sp.) aculeis petioli (pinniferi) faciei inferæ uncinatis, pinnis remote fasciculatis lineari-lanceolatis (long. pedalibus lat $1\frac{1}{2}$ uncialibus) supra carinis 5 quarum centrali parce setosa, spadice decomposito parce aculeato, ramis attenuatis filiformibus, spathis primariis aculeis rectis inequalibus secondariis fere inermibus, spicis scorpioideis distantibus, corolla calycem triplo excedente.

This description is derived from the apex of a leaf and also a male spadix. It is a dioicous, species six or seven feet high.

Petiole trigonal, the under nearly flat face armed with solitary broad claw-shaped aculei, which are ternate towards the apex and in the flagellus. *Pinnules* distantly fasciculate, with or without solitary ones interspersed, linear-lanceolate with a tendency to be spathulate, twelve inches long, one and three-quarters broad, five-keeled above, with two lateral veins also slightly prominent; a few bristles occasionally on the mid-keel; margins rough with appressed bristle-shaped teeth; apex mucronately cuspidate, smooth or somewhat hispid.

Spadix two and a half feet long, nodding or curved, slender and thinly branched, where exposed plano-convex, the convex face armed with short aculei. *Spathes* three or four inches long with short half-ovate limbs, armed with scattered, irregular, straight or hooked prickles. *Branches* attached just opposite the ends of the spathes, about a span long slender, slightly flexuose, their lowermost spathes empty. *Spikes* also inserted opposite the ends of their spathes, (which are lax, clavate, generally armed with a few minute prickles), about an inch long, scorpioid.

Flowers suffulted by an amplectent scale-shaped bract, with a short acute spreading limb, and by a short, obscurely three-toothed, rather large, oblong cup. *Calyx* short, stout, divided below the middle into three oblong, broad segments. *Corolla* three times longer, divided nearly to the attenuate fleshy base, into three oblong, ovate, erect, ascending segments. *Stamina* as usual united to the corolla, above this very shortly monadelphous; *filaments* (free) long, subulate, introflexed in æstivation; *anthers* large, linear-oblong, attached above the middle. *Pollen* yellow. *Pistillum* rudimentary.

HAB.—In watery places at Pular in the Province of Mergui, Tenasserim coast. Gathered in October 1834.

OBS.—In the diffuse slender spadix, this species approaches somewhat to *C. leptospadix*, but otherwise it is abundantly distinct. In its leaves, excepting the flagellus, it approaches nearest to *C. floribundus*, *mishmeensis*, and *latifolius*.

I append to the first section, COLEOSPATHÆ, the two following species of Roxburgh, which may perhaps hereafter be identified by their vernacular names.

C. EXTENSUS R.

Scandent. *Leaves* flagelliferous; *leaflets* alternate, remote, equi-distant, narrow-lanceolar. *Spines* in belts, slender. *Berries* spherical.

Den gullar is the vernacular name in Sylhet, where it is indigenous, and is of great extent, say two or three hundred yards; when cleaned toward the base, it is not thicker than a man's fore finger, but as thick as the wrist towards the apex. The length of the joint is from six to twelve inches. Fl. Ind. 3. p. 777.

C. QUINQUENERVIUS R.

Scandent. *Leaves* flagelliferous; *leaflets* few, remote, equi-distant, lanceolar, five-nerved. *Spines* distinct, few, short and strong; *spadix* decompound.

Hurnur-yullar is the vernacular name in Sylhet, where this species is found, running over trees, to a great extent; the ratan when cleaned is about as thick as a man's finger throughout, and the joints from six to eight inches long. Fl. Ind. loc. cit.

OBS.—In evidence of the numbers of species of this genus, I may mention that I have just received from Malacca a very distinct species of this Section, under the name *Rotang Jarnang*, which is the true name of *C. Draco*.

The species alluded to is distinguishable at once by the very small numerous deciduous prickles of the sheaths, (the old sheaths are merely rough from their scars), the margins of the mouths of which are lacerate-fibrous.

The *petiole* below the pinnules is about a span long, armed with rather distant, stout, somewhat curved prickles, marginal ones being also found here and there: at its junction with the sheath very gibbous and transversely puckered; also among the *pinnules* or *leaflets* short hooked prickles occur along the dorsum, being continued into the slender flagellus.

Pinnules alternate or distantly sub-opposite, linear-lanceolate, caudato-acuminate, ten or eleven inches long, six and a half to seven lines broad, above 1-carinate, carina and a lateral vein on both sides bristly.

For this the name *C. micracantha* may be proposed.

Another species of the same section sent from Malacca, without any name, presents green sheaths, with very few slightly curved white prickles. Total length including the flagellus four feet, of the pinniferous parts twenty-one inches.

Petioles pinniferous to the base, armed with a dorsal row of stout clawed prickles, which towards the apex become binate or ternate with scattered ones intermixed.

Pinnules alternating or fasciculate, the lowermost cartilaginous with swollen insertions, and apparently deflexed, linear-lanceolate, five to seven lines broad, without bristles on either side or with a very few on the carina above, acuminate with bristly points, apparently glaucous underneath.

This appears quite distinct.

Calamus palustris Griff

23. CALAMUS VERTICILLARIS.

TABS. CC. A.B.C.

(N. sp.) aculeis vaginarum verticillatis, verticillis zonis vel ternatis, superioris spinis validis planis deflexis, inferiorum duarum setiformibus in annulum alte coalitis, petioli (flagelliferi) aculeis subtus fasciculatis uncinatis, supra lineatis dentiformibus irregularibus, pinnis æquidistantibus linearibus (long. 12-13 uncialibus lat. uncialibus) supra carina setigera subtus venulis tribus setigeris, spadicis supra-decompositi erecti pedunculo inermi, spathis persistentioribus binis aculeis subulato-setiformibus armatis, floribus minutis numerosissimis.

The description of this species is based upon specimens of an entire upper part of a male plant in flower: but with very few flowers remaining.

Scandent. *Stem* with the sheaths about one inch and a half in diameter.

Sheaths green, armed generally at short intervals with complete whorls of flat very sharp deflexed brown-pointed spines; the spaces between the strong spines are filled with minute bristles. Under each of the above whorls are two others of very slender bristles united to each other high up, so as to form a ring; these bristles, are firm and thorny, white below where united, above black. These two whorls have an ascending direction and cross the whorl of deflexed stout spines. The spaces between the whorls generally are choked up with foreign bodies, or occupied by ants.

Petioles flagelliferous, the part below the pinnules is one and a half or two feet long, flattened, somewhat triangular, armed below with bands or lines (generally complete) of stout thorns, and above with small bristles. In the pinniferous part, which is about six feet long, the under flattish face presents the usual clawed thorns, and the upper angular face with unequal incomplete bands of short, tooth-shaped bristles, confluent at the base.

Pinnules equidistant, generally regularly alternating, linear, about twelve or thirteen inches long, an inch broad and subulately acuminate; above with a central bristle-bearing carina; below with three veins bearing bristles; margins rough with bristly teeth.

Spadix about two feet long or more, erect, axillary, adhering as usual to the next sheath; about three inches from the axilla presenting two *spathes*, which are somewhat two-keeled, and not very concave, armed on the back by lines of stout bristly prickles, the uppermost spathe is rather the largest, about a span long; the sheaths are of considerable length, and similarly armed. The peduncle itself is unarmed. *Branches* ascending, naked at the base, from four to six inches long, much divided, divisions rather spreading and suffulted by an inconspicuous short brownish spathe, with a rather long lanceolate acute limb.

Spikes very numerous, each scarcely more than an inch long, of chesnut-red colour, and suffulted by a similar but smaller spathe. *Flowers* very numerous, about thirty-five to each spike, (of which there are about twelve to the lower divisions of the lower branches), very minute, exactly distichous. *Bracts* amplectent, with a short rather deflexed limb: cup nearly entire, shorter than the bracts. *Calyx* cup-shaped, of the same texture as the cup, three times longer than it, obscurely three-toothed. *Corolla* (in bud) twice as long as the calyx, depressed at the summit, divided to the base into three oblong segments. *Stamens* six. A large oblong rudiment of a *Pistillum*.*

* These parts in the specimen are generally destroyed by insects, and the calyx generally is also more persistent than the corolla.

HAB.—The interior of Malacca, it was brought to me by Emanuel Fernandez, with the name *Rotang Simote.*

OBS.—The marginal spines of the base of the petiole and of the margin of the sheath three or four inches in length.

Spadix of fruit three and a half or four feet long without any remaining spatha, peduncle unarmed, slightly flattened. Branches several, three or four inches distant about ten inches long below the inner side at the insertion cartilaginous, swollen, very flexuose, the middle spikes are four to six inches long flexuose spreading—slightly ferruginous scurfy or pubescent. A male amplectent bract, and two bracteoles the inner of which is almost cup-shaped occur under each fruit.

An amplectent spathe with a rather large linear or linear-lanceolar scarious limb, generally more or less lacerate under each spike.

These are round, about the size of a small marble, covered with rather large reddish-chesnut scales, with whitish edges. At the base is the spread out perianth, the petals are lanceolate oblong, scarcely twice as long as the sepals. At the apex a mammilliform cuspis, which is the remains of the style.

Seed baccate? whitish, erect: tegument rather thick, whitish. Albumen horny deeply ruminate. *Embryo* trochleariform basilar.

The uppermost verticelli, or those with bristles and spines sometimes occur singly

This very remarkable species is evidently allied to *C. mirabilis,* Reinwdt.* to which indeed I should have referred it, had not Reinwardt described his plant as having the long peduncle of the pendulous spathe armed with distichous thorns.

The armature of the sheaths is very curious, and is well characterised by Martius.† It is almost equally distinct by its exceedingly numerous minute flowers, and the great degree of branching of the spadix.

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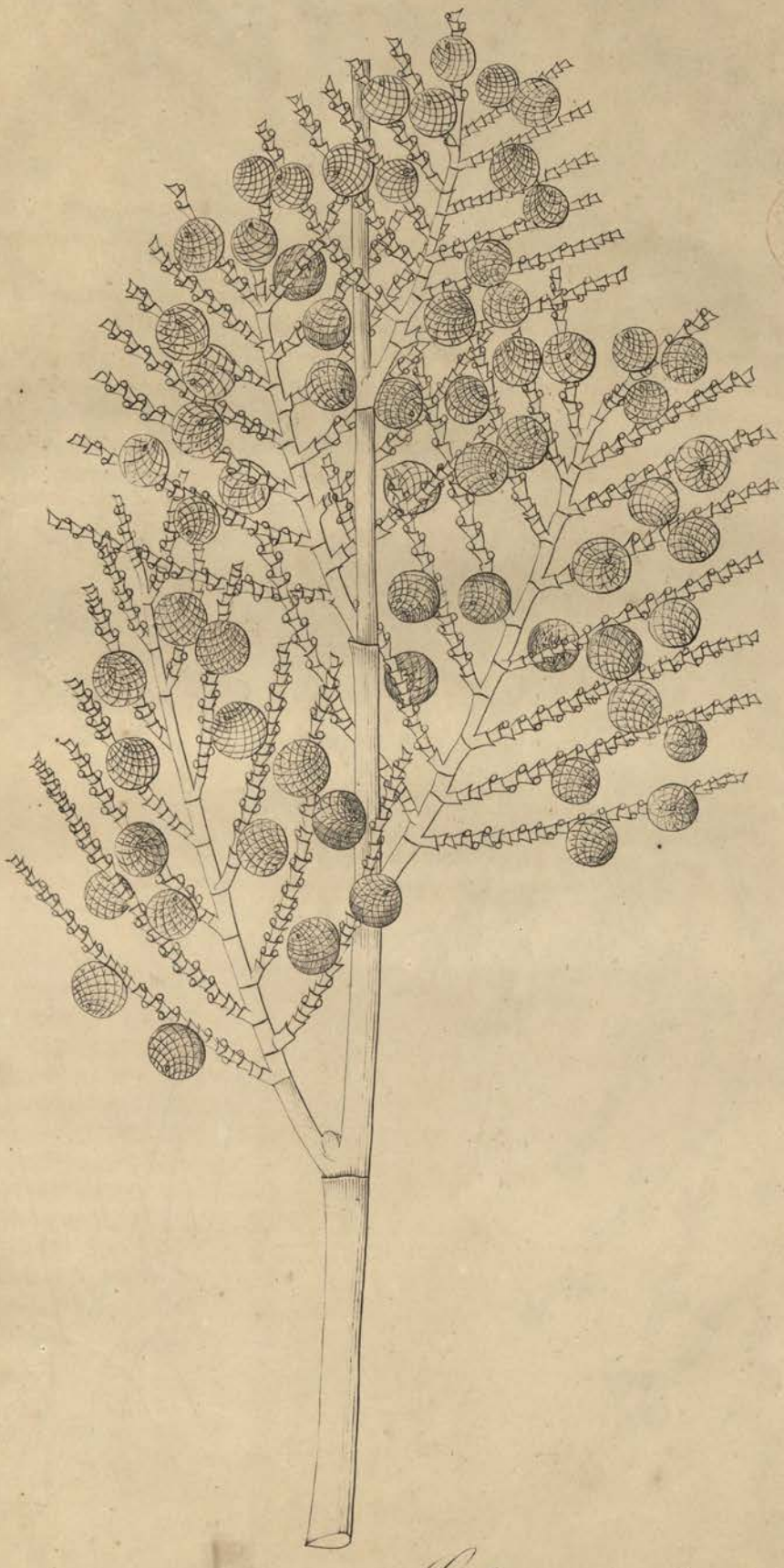
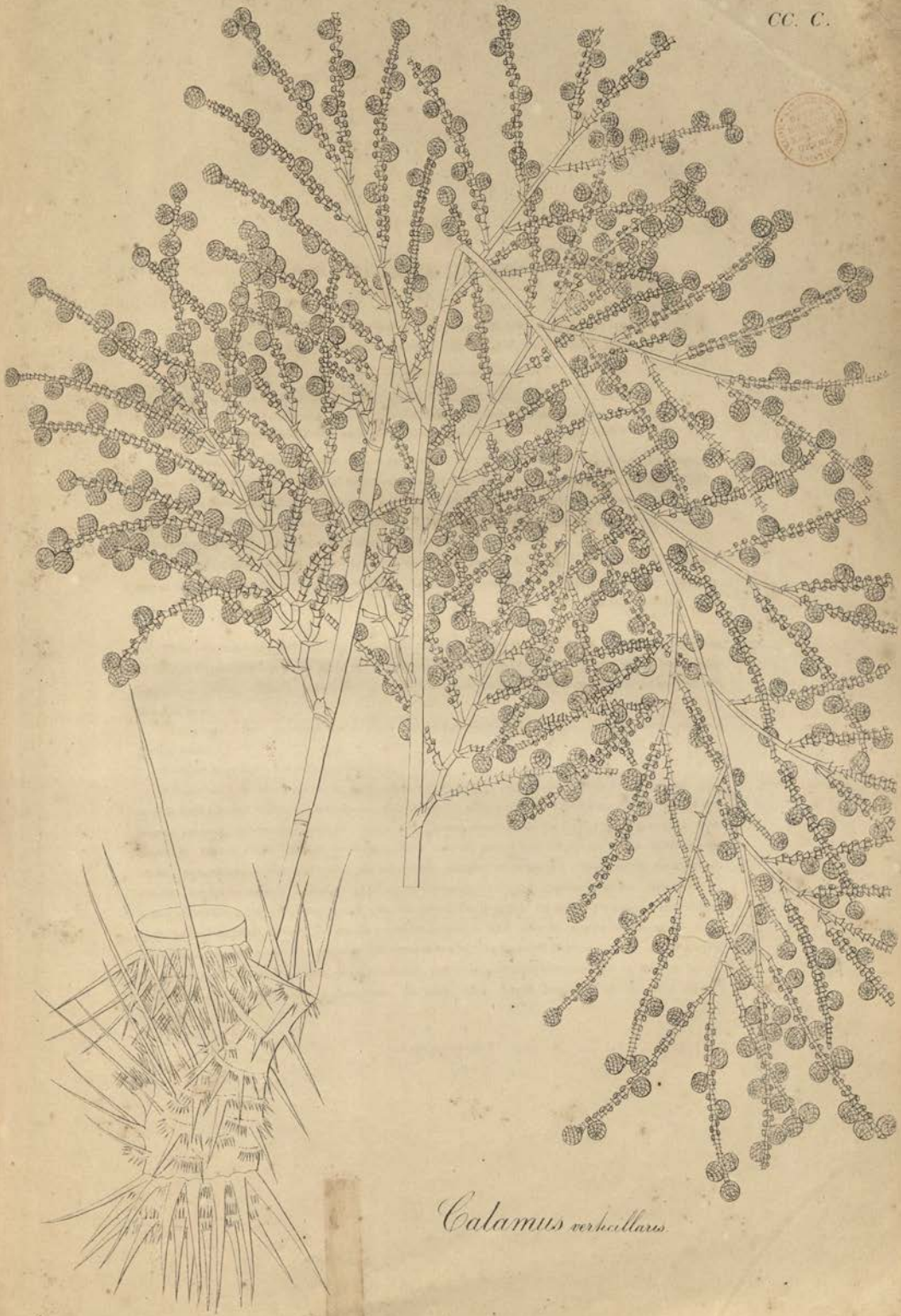
* Mart. Palm. p. 213. † Loc. cit.

Calamus verticillaris



Calamus verticillaris.



Calamus verbullaris

24. CALAMUS DRACO.*

TABB. CCI. A.B.

C. Draco. *Willd.* 2. *p.* 203. *Syst. Veget. ed. Schultes.* 7. *pt.* 2. *p.* 1323. *Roxb. Fl. Ind.* 3. *p.* 774. *Martius Palm. p.* 211. Palmijuncus Draco. *Rumph. Hb. Amb.* 5. *p.* 114. *t.* 58. *f.* 1.

Aculeis vaginarum rectis seriatis petiolorum sparsis, pinnis æquidistantibus lineari-lanceolatis (long. 1½ pedalibus lat. 7-8 linealibus), spadicis decompositi erecti pedunculo aculeis seriatis armato, spathis coriaceis infima dorso seriebus crebris aculeorum intermediis secus centrum parce aculeatis summis inermibus, fructibus ovato-rotundis materie resinosa incrustatis.

The description of this species is derived from specimens of the young, as well as of the mature fruit bearing spadices. Young spadices imbricated with large coriaceous spathes whose margins towards the apex are recurved, almost woody in texture; outside they are ferruginous red, inside chesnut-red. The lowermost much armed with seriate very strong deflexed spines; those next to this are slightly armed along the middle of their backs, the upper ones almost unarmed. Peduncle much armed with stout seriate or fasciculate thorns.

Fruit bearing *spadix* nodding ? nearly two feet long, without spathes, with two or three annular scars beneath that of the lowest branch; peduncle short, armed: branches several, spreading, upper ones simple, lowermost branched, naked at the base. *Spikes* short, stout, flexuose, a squamiform bract and two annular bracteoles under each *fruit*.

These are ovate-round, and placed on short, stout, stalks, surrounded at the base by the calyx, and the spreading or revolute linear-lanceolate petals, are tipped at the point by the remains of the style. Scales with a narrow deep longitudinal furrow, naturally whitish, but incrusted with a rich blackish-red secretion, which is the best Dragon's Blood of commerce.

Seed generally one, sometimes two, in which case they are nearly hemispherical. *Albumen* much ruminated. *Embryo* basilar.

I subjoin Roxburgh's description of this plant.

"*Trunk* while the plants are young, erect, and then resembling an elegant, slender palm tree, armed with innumerable bark-coloured, flattened, elastic spines, often disposed in oblique rows, with their bases united. By age they become scandent, and overrun trees to a great extent. *Leaves* pinnate, their sheaths and petioles armed as above described. *Leaflets* single, alternate, ensiform, margins remotely armed with stiff, slender bristles, as are also the nerves; from twelve to eight inches long and about three quarters of an inch broad. *Spadix* of the *female hermaphrodite* inserted by means of a short armed petiole on the mouth of the sheath opposite to the leaf, oblong, decompound, resembling a common oblong panicle. *Spathes* several, one to each of the four or five primary ramifications of the spadix, lanceolate, leathery; all smooth except the exterior or lower one which is armed on the outside. *Calyx* of the female or rather *female hermaphrodite*. *Perianth* turbinate, ribbed; *mouth* three-toothed, by the swelling of the germ, it splits into three portions, and in this manner may be seen adhering with the corolla to the ripe berries. *Corolla* three-cleft; *divisions* revolute, glandular on the inside. *Berry* round, pointed, of the size of a cherry." Roxburgh.

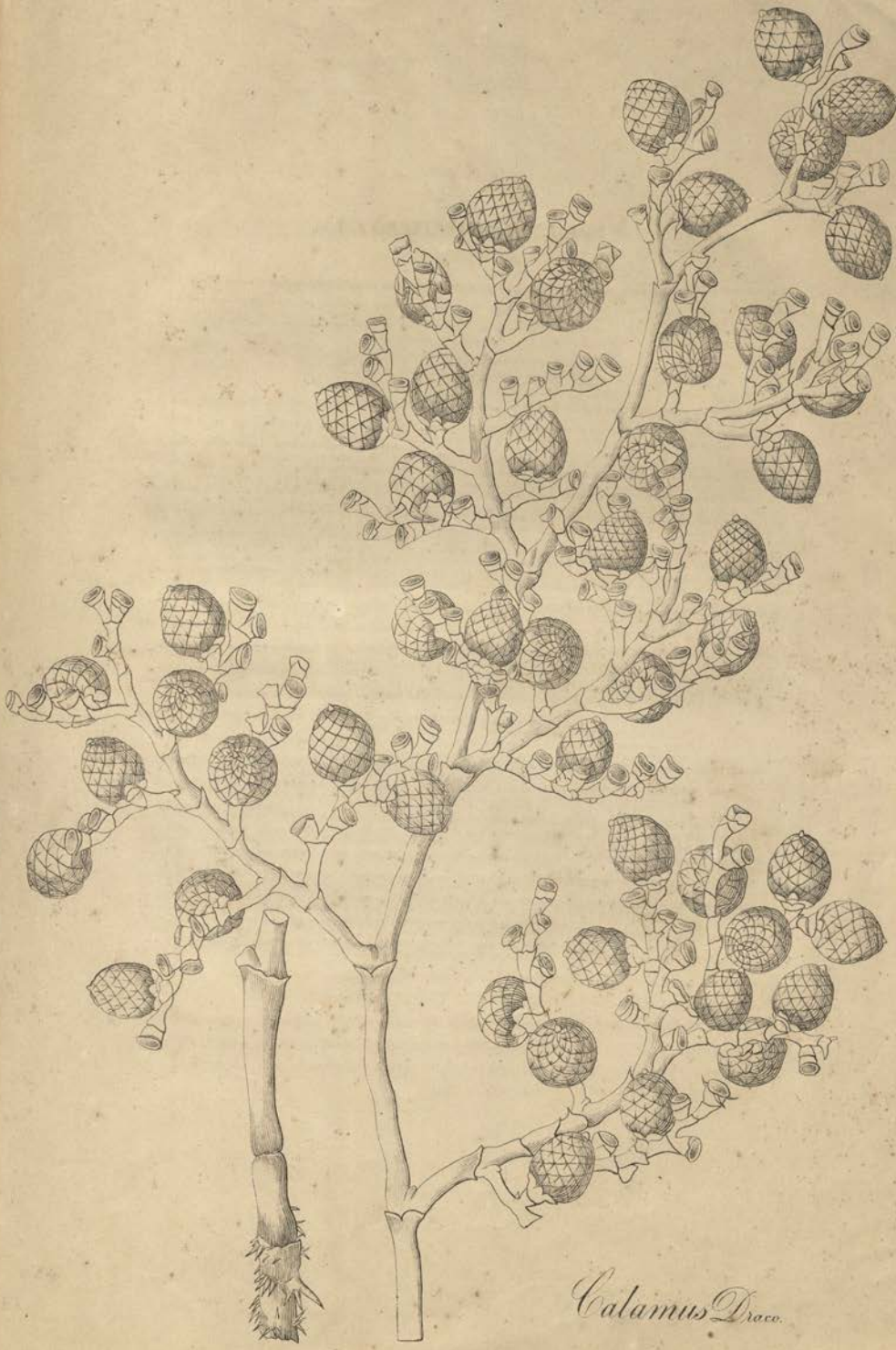
* Char. part. e Roxburghio.

HAB.—A native of Sumatra and the Malay Islands. Flowering time March and April. according to Mr. Lewis, it is the *Jarnang* of the Malays of Penang.

The natural secretion of the fruit constitutes the best *D'jurnang*, or Dragon's Blood; a second and rather inferior kind is produced from the fruits, from which the natural secretion has been removed by heat and bruising. The third and most inferior, appears to be the refuse of this last process. It is perhaps doubtful, whether this article is procured from the plant by incisions.

The above is taken from Rumphius, who has a copious article on the subject.* Mr. Lewis informs me, that he long ago forwarded a full account of the preparation of this Dragon's Blood to Dr. Wallich; its true source not appearing to him to be generally known.

Calamus Draco



Calamus Draco.

25. CALAMUS GENICULATUS.

TABS. CCII. A.B.

(N. sp.) aculeis petioli (flagelliferi) pinniferi subtus uncinatis semi-verticillatis supra sparsis dentiformibus, pinnis æquidistantibus lineari-lanceolatis (long. 14-uncialibus lat. uncialibus) supra 1-carinatis (carina parce setosa) subtus venis 3 setigeris margine integerrimis, spadicis geniculati pedunculo bipedali compresso secus margines valide aculeato, spathis omnibus demum deciduis, fructibus rotundis rostratis (albis).

The description of this species is founded on portions of a leaf and 3 spadices with immature fruits.

Petiole (of the pinniferous portion) obtusely trigonal, underneath armed with hooked claws, the upper angle here and there with small tooth-shaped prickles.

Pinnules approximate, often sub-opposite, linear-lanceolate, fifteen or sixteen inches long, one broad, subulately acuminate, with three prominent veins on the upper surface; of these the central one bears a few bristles towards the apex, the under surface furnished with two lateral veins and which are as well as the central towards the apex bristly, margins except the point without bristles or teeth.

Spadix three feet long. *Peduncle* below the branches one foot and a half long, flattened, not two-edged, with scars of a row of stout marginal spines; above, the branches are unarmed, and at the insertion of each branch, swollen into knots. First scar of the spathes situated immediately under the lowest branch. *Branches* all naked at the base, the lowermost a span long, angular, and stout.

Spikes spreading, suffulted by lanceolate acute scarious bracts, stout, flexuose, two or three inches long: some of them present subulate abortive branches.

Flowers subsessile at the flexures, suffulted by a scale-shaped annular bract, and at the base surrounded by two annular alternating bracteoles, the inner of which is almost cup-shaped.

Fruit subglobose, cuspidate by the base of the style, and surrounded by the calyx, more or less split, and by the corolla much more split and tending to be lacerate; its segments are oblong, twice as long as those of the calyx; scales large, pale, yellowish-white with a narrow central furrow and dark brown margins with whitish edges.

Seed one, (immature).

HAB.—Penang, where it was found by Mr. Lewis. It is the *Rotang Dodoor* of the Malays of that Island.

OBS.—This species comes very close to the succeeding, and there is a similarity in the Malayan name which would indicate their being the same. Nevertheless I have little doubt of its being quite distinct, especially from the smooth margins of the leaves, a very unusual character, the flat, not two-edged peduncle armed strongly along the edges, the swollen nodes, the stout, rigid, very flexuose spikes, and the round fruit.

The spikes call to mind by their flexures, the spikes of some Rottbotliaceous grasses.

26. CALAMUS LONGIPES.

TABS. CCIII. A.B.

Palmijuncus verus angustifolius. *Rumph. Hb. Amb. 5. p. 105. t. 53. fig. 2.?*

(N. sp.) aculeis vaginarum planis seriatis vel solitariis setis presertim versus margines interspersis, petioli (flagelliferi) infra pinnas paucis subulatis inequalibus, inter pinnis uncinatis solitariis, pinnis æquidistantibus lineari-lanceoletis (long. 14. uncialibus lat. uncialibus) supra venis tribus setigeris, spadicis decompositi elongati nutantis pedunculo bipedali ancipiti subinermi. spathis omnibus dimum deciduis, fructibus oblongis styli basi cuspidatis, basi calyce tantum circumcinctis.

This description is taken from the apex of a fruit-bearing plant, fully expanded, leaf wanting.

Sheaths very much armed with stout flat spines, broader than usual, with bristles often intermixed, those along the margins, are very bristly, more slender, but not longer. The marginal ones of the base of the petiole are subulately triangular, and rather longer than any of the others.

Petiole at the base convex below, channelled broadly above, and armed with long irregular spines, (which about a foot from the axil appear reduced to a marginal row of distant short straight teeth, and another similar row along the centre of the lower face), inclusive of flagellus, about twelve feet long; the pinniferous portion is about seven feet long; the first two feet being naked, above the channelled part, the upper surface is rather flat, and convex underneath. Between the pinnules it is obtusely triangular, above unarmed, below armed with solitary distant short aculei or prickles.

Pinnules about fourteen inches long, and about an inch broad, linear-lanceolate, and subulately acuminate, the upper face having the central and two lateral veins sparingly bristly; the under surface smooth; margins and apex bristly.

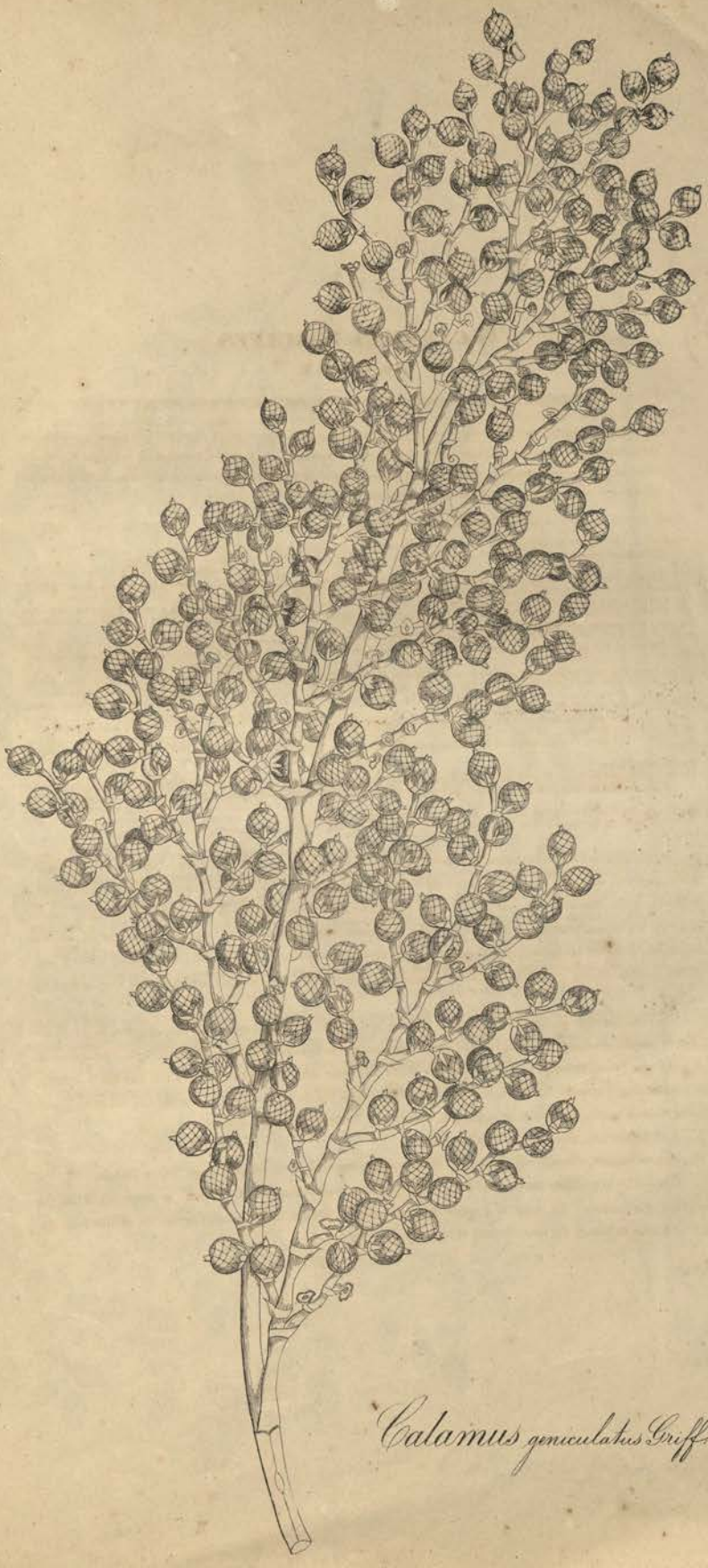
Spadix adhering to the next sheath as usual, throughout the lower two, or two feet and half feet of its length, naked, unarmed, or with a very few and not very strong spines along the edges, compressed, distinctly two-edged, marked with the annulus of the first spathe, which suffults the lowest branch of the spadix; surface irregularly sprinkled with brown chaffy matter, Fruit-bearing part a little more than eighteen inches long, rather compressed, but not two-edged. *Branches* several, angular, themselves much divided, the lowermost four or five inches apart: without suffulting spathes. *Spikes* varying in length, the lowermost of the lowest branches four or five inches long, spreading, angular.

Fruit on shortish stalks, the uppermost of each spike is nearly sessile, spreading, oblong-ovate, in length six lines, in breadth three and a half, attenuated into a short mammilla terminated by the base of the style, and surrounded at the base by one envelope! divided below the middle into three oblong segments, between this and the fruit itself, is a short cup variously lacerated, and outside at the apex of the stalk, two bracts, the outer one sub-annuliform. Scales whitish, cartilaginous, with pale margins, the central furrows deep and consecutive.

Seed (immature), oblong. *Albumen* ruminate.

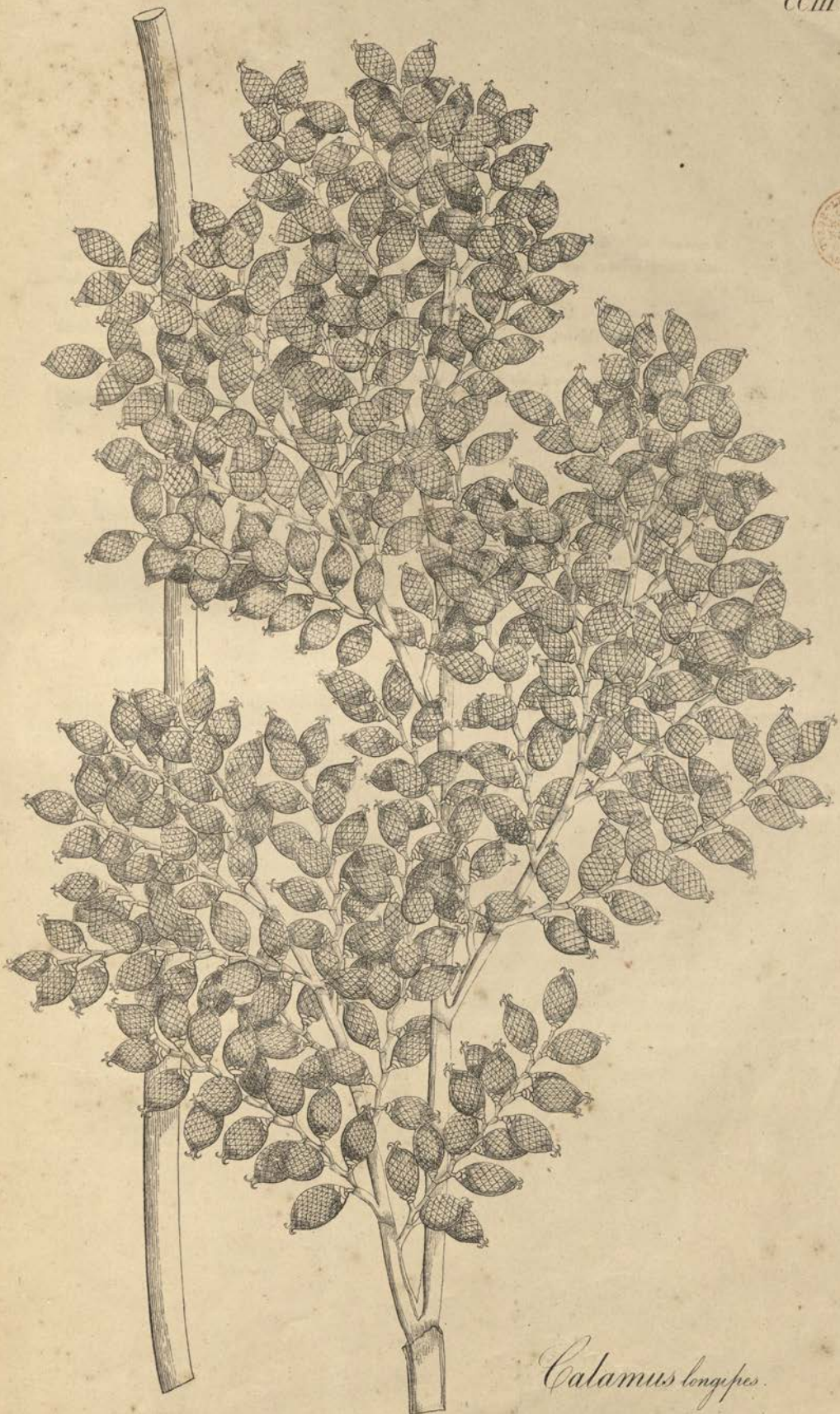
HAB.—Malacca, where it was obtained by E. Fernandez, and sent to me with the name *Rotang* Dodow.

OBS.—This is probably the plant of Rumphius, quoted by most authors as *C. verus;* it resembles it in the length of the spadices, the want of a spathe when in fruit, the distance of the *annulus* or cicatrix of this from the axilla, and its suffulting the lowest branch of the inflorescence.



Calamus geniculatus Griff.

Calamus longipes Griff:



Calamus longipes.

It is as may be supposed, very closely allied to the *C. platyacanthus* of Martius,* from which however it differs in the very long two-edged peduncles of the spadix, the want of spathes when in fruit, in which points Martius' plant differs from that of Rumphius.

It is the only one I have yet seen of this Section in which all the spathes appear to be deciduous, or in which the fruit is only surrounded by one envelope, the corolla being apparently for the most part deciduous. In this again it differs from Martius' plant.

From the preceding, to which it is closely allied, it is known at once by the absence of the remarkable very long spines to the margins of the mouths of the sheaths, and by the spadix and fruits.

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* Martius' Palm. p. 206. t. 160 f. i. ii. iii.

27. CALAMUS HYSTRIX.

TABS. CCIV. A.B.C.

(N. sp.) aculeis vaginarum seriatis vel sparsis marginum longissimis spithamæis vel pedalibus, petioli (flagelliferi) infra pinnas valde inæqualibus sparsis patentissimis, inter pinnas subtus uncinatis supra minutis dentiformibus, pinnis æquidistantibus confertis linearibus (long. 16-uncialibus lat. 5-6 linealibus) supra carina et carinulis duabus setigeris, subtus venis 5 setosis spadice decomposito erecto, spatha crebre armata spinis marginum apicem versus longissimis, spicis florum fœmineorum ascendenti-convergentibus fructum patentibus, dentibus calycis villosis vel pennicillatis, fructibus oblongis albis.

The description of this species is derived from specimens of the entire plant with female flowers and fruit. It is climbing to a great extent, and flagelliferous; the diameter of the stem towards the flowering part, is $1\frac{1}{4}$ inch. The *sheaths* are swollen at the insertion of the petiole, armed with strong large flat spines, distinct, or in the usual incomplete verticils, those of the margins of the mouth of the sheath are exceedingly long, a span or a foot in length, and proportionally broader at the base.

The *petiole* is $1\frac{1}{2}$ to $1\frac{3}{4}$ feet long in its naked part, where it is rather angular and variously armed. The spines of the margin are one inch long, and subulate, the others aculeiform, while the upper flatter face has small thorny teeth. The pinniferous part is five or six feet long, rather angular, armed above along the centre with short straight teeth, below with solitary hooked thorns. These are as usual continued into the *flagellus*, which is very long.

Pinnules very numerous, generally approximate in pairs, linear, subulately acuminate, 16 inches long, 6 lines wide, the under face with five bristle-bearing veins, the upper has the mid vein carinate, one lateral, one on either side subcarinate, bearing bristles chiefly above the middle; margins bristly, ciliate; apex as usual hispid.

Spadix $2\frac{1}{2}$ feet long, (exserted, 2 feet), the peduncle adhering to the next sheath, and is in the young state so imbricated with spathes as to be subulate; of these spathes the lowermost four are armed, armature gradually diminishing from the base upwards. In flower, it has one *spathe* near the axilla, boat-shaped, four or five inches long, flattish or nearly revolute at the apex, coriaceous, armed on the back with very strong broad spines, of which the uppermost along the margins are a good deal the longest, and awl-shaped from a flat base. *Branches* several, with the same ascending direction as the peduncle, naked at the base. *Spikes* two or three inches long, also ascending, slender, flexuose, ferrugineo-furfuraceous, suffulted at the base by an obscure squamiform bract.

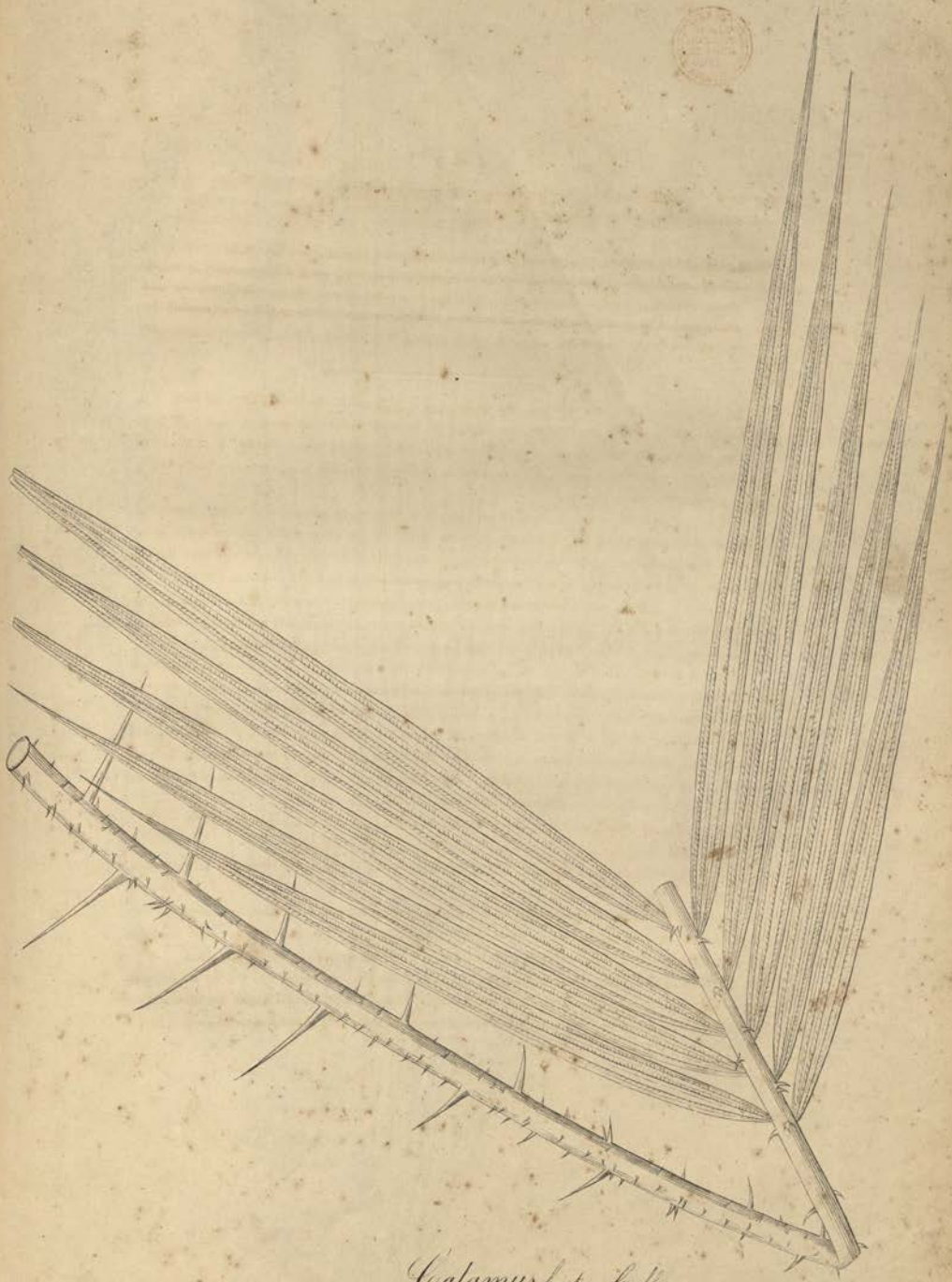
Flowers solitary on short stalks, occupying the flexures, stalk furnished with one minute bracteole!

Calyx short, cup-shaped, obsoletely three-toothed, teeth short, villous at the points.

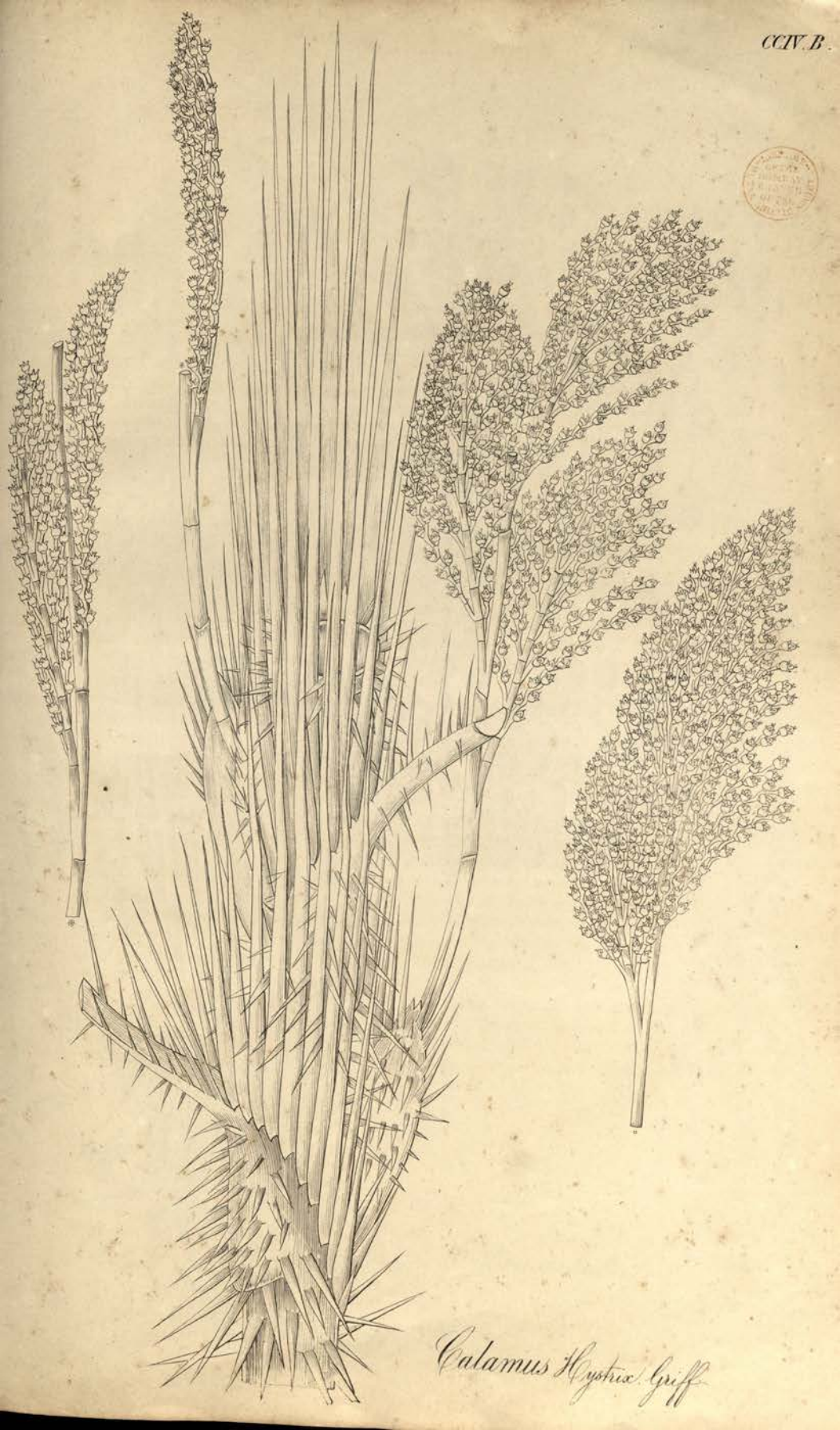
Corolla with a sub-globose base, twice as long as the calyx, divided to the middle; segments half-lanceolate, spreading.

Stamens adhering to the corolla at the base of its segments; *anthers* linear-sagittate, effete, or obsolete on very short *filaments*. *Ovarium* ovately-roundish, covered with shortly ciliate scales, 3-celled at the base. *Style* divided to the base into three oblong-clavate segments, very lamellar, and papillose on the inner surface and sides.

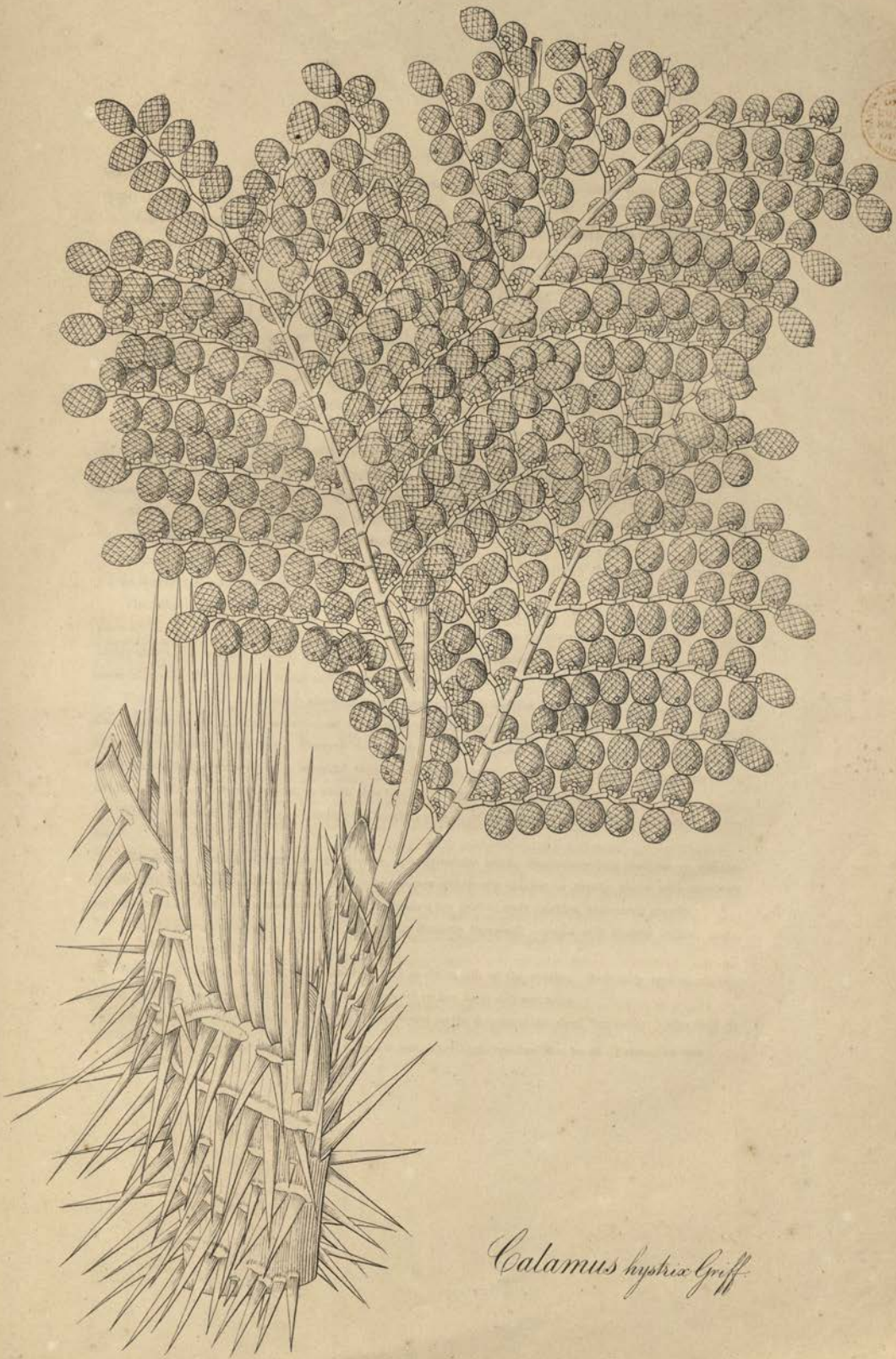
Fruit-bearing spadix, with or without the spathe. *Spikes* spreading, very flexuose. Stalks of the fruit spreading. *Fruit* surrounded at the base by the persistent envelopes, elliptic, shortly mammillate at the apex. Scales large, cartilaginous, appearing to the naked eye to have two lines down the centre, margins cartilaginous. *Seed* 1



Calamus hystrix Griff



Calamus Hystrix Griff.



Calamus hystrix Griff.

oblong, erect. *Tegument* dark-brown, with the usual resiniferous pits, rather thick in some parts. *Albumen* horny deeply ruminate. *Embryo* basilar.

Hab.—In forests of Ayer Punnus, and Rhim, in the Province of Malacca. Malayan name *Rotang Sabote.*

Obs.—This species is closely allied to *C. platyacanthos*, Mart. from which, however, it is at once distinguishable by the enormously long spines of the margins of the mouths of the sheaths. The armature of the lowermost and most persistent spathe also differs in the analogous elongation of the spine of its apex. The teeth of the calyx are moreover, tufted with hairs, and the fruit of the same period of development is oblong, not obovate as in the species alluded to. Prof. Martius also gives the spadices in his species as "pedes nonnullos longi." *

It appears to vary a good deal. I have specimens sent by E. Fernandez from Malacca, under the name *Rotang Pusaisur*, which is of smaller size, the spadix (with young fruit) not a foot in length, and the flowers with two bracteoles. But otherwise the plants are so much alike, and there appears to be so great a tendency to vary in the length of the spadices, that I have thought it better to unite the two, particularly as so little is yet known of the real value of the characters employed in the distinction of the species.

The female spikes in flower resemble a good deal the same parts of *C. leptopus*; and it is to be remarked that the lowermost spathe though persistent for a long time, presents scarcely any sheath.

In the armature of the petioles it may be considered to approach in some degree to *C. castaneus*, the thorns in both being often, or generally solitary, and very unequal in size.

Rumphius' figure of Palmijuncus verus angustifolius† gives, with the exception of the want of the long spines, a good idea of this species in fruit.

The following additional particulars‡ regarding this species may be here stated. It is a stout climber, the young parts are scurfy, the diameter of the stem with the sheaths $1\frac{1}{4}$ to $1\frac{1}{2}$ inches, the sheath with a short oblique mouth, highly armed with unequal, solitary, very spreading or reflexed brownish green flat spines, the largest an inch or rather more in length. In its seeds it comes near to *C. Mastersianus.*

The naked base of the *petiole* is about six inches long, the upper flat face is armed with erect unequal prickles, the under convex face is chiefly armed about the margins with stout spreading shortish prickles, with or without a row of smaller ones along the dorsum. Between the pinnules above, roundish, low down with *similar* erect prickles, above unarmed, dorsum with a few marginal *similar* ones: below, and throughout with a row of hooked ones along the dorsum, these above are clawed, in which state they are continued into the flagellus.

The whole length of the *leaf*, including the flagellus, is eight or ten feet long, the flagellus itself three to five feet.

Pinnules are placed in distant irregular fascicles, conduplicately sessile, linear-lanceolate, fourteen to eighteen inches long, and $2\frac{1}{4}$ broad, sub-spinously acuminate, margins spinulosely toothed or bristly, above with about six carinate veins, of which the centre towards the base, bears a few solitary erect prickles, underneath smooth.

Spadices green, axillary, from three to five feet long, distantly branched, covered with sheaths without limbs, considerably prickly chiefly above the middle.

Branches spreading, adnate to the peduncle as high as the mouth of the spathes. Secondary spathes slightly armed, spikes from opposite the mouths of these, 3 or $3\frac{1}{2}$ inches long, sub-ascending.

Flowers solitary tribracteolate, a scar of a second flower on the dorsum of the third bracteole. *Calyx* trifid to

* Palm. loc. cit. † Herb. Amb. v. t. 54. f. 2. C. verus of most authors. C. platyacanthos. Mart. loc. cit. ‡ January 1st. 1845.

the middle. *Corolla* of the same length. Young *fruit* of oblong shape, rostrate by the style which is divided to the middle into three revolute segments.

Seed sub-immature berried, greenish. *Raphe* of two distinct white lines, incurved at the points, tegument baccate, viscid, thickened at the centre of the raphal face. *Albumen* in the dorsal part foveolate, in the ventral part with a central pit. *Embryo not seen.*

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28. CALAMUS LEPTOPUS.

TABB. CCV. A.B.

(N. sp.) spinnis vaginarum seriatis, petiolorum (flagellifer) : partis inferioris nudæ seriatis, aculeis partis pinniferæ uncinatis, pinnis æquidistantibus lineari-lanceolatis (long. 15-16-uncialibus lat. 12-13-linealibus) cirrhoso-acuminatis supra 1 carinatis sub-glabris subtus sæpius venis 3 setigeris, spadice nutante vel pendulo decomposito infra spathas spinis subulatis armato, spathis coriaceis infima spathiformi secus carinas duas armata reliquis planis inermibus, spicis ascendenti-convergentibus, floribus oblongis.

The description of this species is derived from specimens of the apex of the flower-bearing stem of a female plant.

It is scandent; the diameter of the stem and sheaths about one inch. *Sheaths* about a span long, armed with fascicles of flat rather deflexed spines, shorter and stouter than usual; at the base of the petiole swollen transversely.

The *petiole* in its lower naked part, is about two feet long, triangular, and armed with similar and generally solitary but smaller spines, those of the margin subulate and slender: the pinniferous part is convexly trigonal, the under convex-face being armed with clawed prickles, placed three or four together, the upper is unarmed or with smaller prickles.

The *pinnules* or *leaflets* many, alternating, sometimes almost opposite, linear-lanceolate, fifteen or sixteen inches long, twelve or thirteen lines broad, acuminated into a long cirrhose bristle; mid vein prominent above, and generally smooth; underneath as well as the two lateral veins: with a few bristles margins bristly especially towards the point.

Spadix (young) club-shaped, mature pendulous (?); peduncle about a foot long; the exserted part flattened, slender, about a span long, much armed chiefly along the edges with short stout spines placed in twos or threes: alternately and distantly branched, each branch suffulted by a large leathery ascending *spathe*; of these the outermost is spathiform, the margins revolute towards the apex, indistinctly bi-carinate, with stoutish solitary spines along the keels; the rest flat, unarmed, about a span in length. *Branches* two or three times shorter than their spathes, nearly of the same direction with the spadix, with distichous slightly spreading ramifications. These (the *spikes*) are one and a half to three inches long, distinctly flexuose: bearing at each flexure a scale-like amplectent bract, and one flower.

Flowers all pushed to the posticous side, on short stalks or nearly sessile, surrounded at the base by a short, somewhat 3-toothed cup, outside which on the posticous side is a larger bract, and on the anticous side a smaller one. See Tab. CCXVI. Fig. IV.

Calamus leptopus Griff.

Calamus leptopus Griff.

Calyx oblong-ovate, rather large, with three short stout acute teeth. *Corolla* in the part corresponding to the calyx ovate-ventricose, 3-partite a little below the middle (or down to the calyx), segments linear, acute, rather spreading. *Stamens* 6 ; *filaments* united to the corolla as far as the base of its segments: from thence it is free, short broad-subulate and ending in bristles ; *anthers* deficient.

Ovary ovately oblong, densely covered with shortly ciliated scales, 3-celled. *Ovules* solitary. *Style* very short, stout, divided nearly to its base into three branches which are subulate, spreading or almost recurved, rather longer than the petals, with an elevated line along the centre of their backs ; the inner face stigmatic.

HAB.—Malacca. *Rotang Chinchin* of the Malays.

OBS.—This species differs from *C. platyspathus** abundantly. The petioles (not the spadices) are prolonged into flagelli or thongs, the spines of the sheaths are distinctly seriate, the pinnules neither plicate, nor tomentose underneath.

It comes close to the preceding Section, its young spadices having a strong resemblance to those of *C. Draco*. The mature spadices again resemble to some extent those of *C. Hystrix*, and there is moreover a tendency in the spathes to be deciduous.

To this section belongs the Katu-tsjurel RHEEDE. *Hort. Mal.* 12. *t.* 65. Referred by ROXBURGH to his Calamus latifolius, which species, may be distinguished as *C.* (*Platyspatha*) RHEEDEI, petiolis spadicibusque aculeatis, pinnis distanter fasciculatis lineari-lanceolatis.

* *C. platyspathus* : scandens, aculeis vaginarum crebris subulatis rectis petioli rectis et reduncis, pinnis sparsis lineari-lanceolatis long. subpedalibus lat. pollicaribus plurivenüis plicatis subtus ferrugineo-to mentosulis, spadicis aculeis rectis abortivis loriformibus, spathis subinermibus spicis abbreviatis confertis. Char. e MARTIO. *C. platyspathus*, MART. *Palm. p.* 210.

HAB.—Tavoy, Tennasserim Provinces. W. GOMEZ.

I subjoin DR. MARTIUS' character and description of this species :—

" *Calamus platyspathus : caudice scandente tenui ; frondibus cirrosis ; pinnis sparsis; terminalibus distinctis lineari-lanceolatis plurinerviis plicatis, subtus ferrugineo-tomentosulis, aculeis vaginarum crebris subulatis rectis, petioli rhacheosque rectis et aduncis ; spadicis masculi decompositi, julis abbreviatis confertis, aculeis rectis ; spathis (primum clausis, dein expansis ?) planis, subinermibus ; loris aculeatis.*

Species distinctissima. Pinnae spithamam ad pedem longae, medio ultra pollicem latae. Spadix sesquidalis, laxus, rhachi inferne ancipiti superne teretiuscula. Rami florigeri masculi quadripollicares et sursum breviores, primum, ulti videtur, spathis membranaceis omnino involuti, quae tandem explanatae, dorso nervis binis nunc passim aculeatis nunc inermibus sunt percursae. Juli cujusvis rhacheos partialis secundo-convergentes, continent flores 7-11 parvulos, pariter in unum idemque latus conversos, quasi uti in racemo scorpioideo. Calyx campanulatus sinubus rotundatis in denticulos tres breves excisus pallidus. Corolla viridiflava, petalis lanceolatis."

29. CALAMUS MASTERSIANUS.

TAB. CCVI.

(N. sp.) vaginarum spinis plano-subulatis sub-deflexis aculeis irregularibus interspersis, petioli partis nudæ dorsalibus et marginalibus aculeis interspersis, aculeis partis pinniferæ dorsalibus cum vel absque marginalibus, pinnis æquidistantibus linearibus (long. 13-uncialibus lat. 7-linealibus) cirrhoso-acuminatis, supra carina centrali et venula laterali utrinque setigera subtus vena centrali setulosa, spadice (flagellifero) aculeato masculo supra-decomposito, spathis planis coriaceis extus glaucis infima bicarinata secus carinas aculeata, spicis fœmineis distantibus patentibus, floribus conicis, corolla calyce paullo-longiore, fructibus pisiformibus cuspidato-rostratis (albidis), albumine subæquabili.

The description of this species is derived from specimens of the female plant in flower and fruit, and a portion of a male spadix.

The *stem* with the sheaths about half an inch in diameter. The *sheaths* are armed with stout flat spines, somewhat deflexed, concave underneath, arising from a large sub-conical base; among these, except perhaps towards the apex of the sheaths, occur smaller prickles, very irregular in size. *Ligula* very large and coriaceous. *Petiole* a good deal swollen at its insertion: the lower naked part is three and a half or four inches long, plano-convex, armed on the centre of the under face with a row of distant spines like those of the sheaths but smaller, along the margins with still smaller ones, interspersed with small prickles. Pinniferous part (which is three or four feet long) armed with stout clawed prickles along the centre of the under face, a few others being added about the margins.

Pinnules equidistant, linear, about thirteen inches long, seven lines broad, cirrhosely acuminate, 1-carinate above, with a carina and a lateral vein on either side, bristly towards the apex, mid-vein of the under surface with a few smaller bristles: margins rough with minute bristle teeth.

MALE. *Spadix* supra-decompound, more slender than the female; branches a span long. *Spathes* more membranous, especially about the limbs. *Spikes* scarcely more than an inch long, slender, very flexuose, spreading or recurved, sometimes scorpioid, arising from a cartilaginous base opposite the ends of their spathes. *Bracts* with an acute spreading limb. *Cup* very shallow, almost wanting anticously, posticously broadly emarginate and sub-bicarinate.

Flowers oblong-ovate, exactly distichous. *Calyx* with a broad cartilaginous base, divided to the middle into three broad rather acute segments. *Corolla* about twice as long, in the bud, it is ovately conical, and divided almost to the attenuated base into three lanceolate-ovate segments. *Stamens* shortly monadelphous; *filaments* (free) subulate, about half the length of the petals; *anthers* ovately sagittate, yellow. Rudiment of the *Pistillum* large, of three oblong bodies like abortive carpel leaves.

FEMALE. *Spadix* five or six feet long, decompound, nodding. *Peduncle* adnate to the next sheath, plano-convex, armed on the convex face chiefly along the centre, with broad hooked prickles, along the edges with spreading subulate middling sized spines, the armature is continued above this in the shape of hooked prickles which gradually encroach on the surface of the peduncle, so that the apex has the whole surface armed. A linear, coriaceous, entire or split *spathe*, brown inside, whitish outside, is situated at the base of each branch; the lowest about a foot long, bicarinate, carina armed except towards the apex with stoutish prickles, subulate from an oblique bulbous base. The remaining spathes diminishing in size gradually, all unarmed, sometimes split and lacerated, subsequently the tubular parts alone remain. *Branches* of the spadix longer a good deal than the internodes, bearing many filiform spreading,

Calamus mastersianus Griff.

flexuose spikes, two to four inches in length, surrounded at the cartilaginous base by a whitish scale-shaped annular bract.

Flowers distichous, rather distant, one at each flexure, of the shape of a sugar loaf, small, suffulted by a small annular scale-shaped bract, and two minute bracteoles. *Calyx* oblong, conical, of a thick substance at the base, with three short sub-cordate mucronate teeth with whitish membranous margins. *Corolla* oblong-ovate, a little longer than the calyx, divided nearly to the middle; segments erect rather obtuse. *Stamens* six; *filaments* not adnate to the corolla, united into a cup surrounding the lower free part of the ovary, very short; *anthers* ovately sagittate, effete. *Ovary* oblong-obovate, smooth at the base, where it is 3-celled, otherwise covered with scales. *Style* (common) scarcely any, the branches revolute from the base, subulate, and stigmatose inside. *Ovule* solitary.

Fruits very numerous, of the size of a pea, surrounded at the base by the perianth, beaked by the hard persistent base of the style. *Scales* very numerous, minute, whitish with fuscous margins and points, which are incised. *Seed* baccate, erect, roundish-placentiform. *Tegument* thin; pulp gelatinous, thick opposite the *chalaza*, and in a less degree on the opposite face. *Raphe* of two divergent whitish branches, terminating about the middle of the ventral face of the seed. *Albumen* cartilaginous, solid, surface slightly unequal; opposite the *chalaza* is a shallow foveola, and a smaller and shallower one on the opposite face; on a long section it appears pully-shaped. *Embryo* basilar, conical.

Hab.—Assam, No. 1201, of my Assam collections. *Soondee-bet* of the Assamese. The smallest *bet* of Assam Major Jenkins.

Obs.—This appears to be a very distinct species, especially in its inflorescence. It has considerable affinities with *Calamus tenuis*, especially in the female spikes and flowers. I have dedicated it to my friend Mr. Masters, late Head Gardener of the Hon'ble Company's Botanic Garden Calcutta, who is now investigating the Flora of Assam with great success.

Specimens, of the upper part of a male plant in flower, subsequently received from Major Jenkins are about the same size as the female.

Sheaths greatly armed with seriate very broad, very strong, rather short flat spines, and with many much smaller, so as to be aculei-form. The large ones have a tendency to be decurrent, and above are adnate to the sheath by means of a broad callus, one on either side of the base of the petiole is two or three inches long, and much more slender.

The naked lower part of the petiole about a span long, armed on the centre of the dorsum with stout short rather deflexed spines, along the margin with longer ascending ones otherwise, especially towards the base, armed with small prickles. Young *petiole* sprinkled with brown scurf. The pinniferous part—? feet long, convex, bifacial; the convex lower face armed with irregular scattered, generally solitary, and somewhat hooked spines, which above, pass into hooked aculei.

Ligula very long, membranaceous and brown. *Leaves* four or five feet long.

Pinnules equidistant, linear-lanceolate, shortly subulate-acuminate, ten or twelve inches long and one broad, above tricarinate, carinæ and a lateral vein on either side, bearing strong bristles; the under surface with three veins, bristle-bearing, margins bristly.

Spadix very long, peduncle to the first spathe three or four inches long, compressed, ancipitous, armed along the margins with stoutish rather short spines, and on the dorsum with scattered irregular prickles otherwise on the

dorsum with stout claw-shaped aculei which are continued into the flagellus, each division is suffulted by a small membranous spathe.

Flower-bearing branches of the spadix about the length of the internodes, adnate to the peduncle of the spadix for three or four inches, flexuose, geniculate.

Spathes one to each branch at first completely involute round the branches, and the peduncle linear, a span or a foot long, coriaceous, the lowermost bicarinate, armed along the carinæ with ascending rather stout aculei, the rest unarmed or with a few prickles here and there.

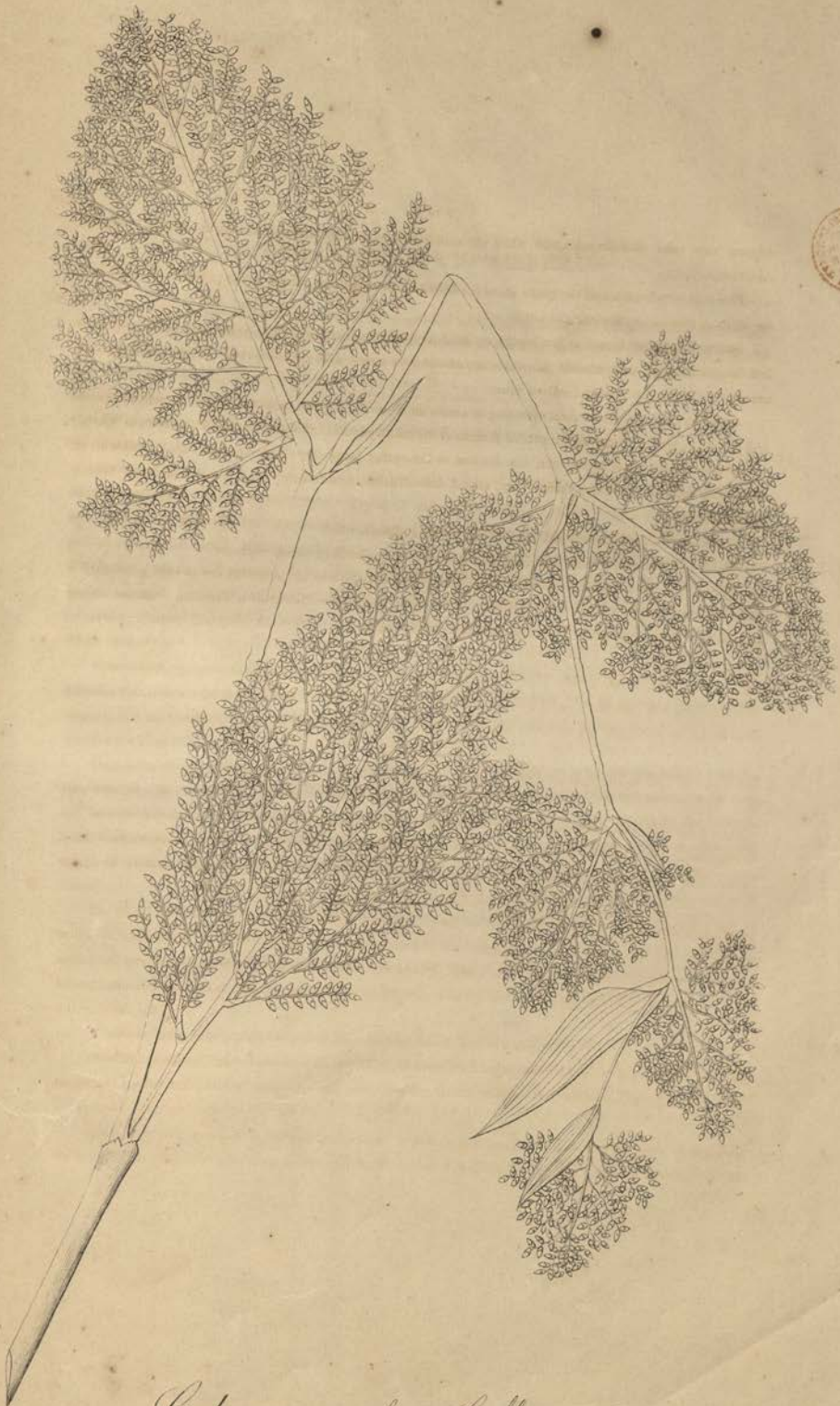
Spikes inserted on flexuose short spreading or somewhat recurved branches (or as the uppermost simple) scarcely $\frac{1}{2}$ an inch in length, occupying the swollen flexures at the insertion when suffulted by a small squamiform spathe.

Flowers distichous, close together, the flexures of the spikes being very short, each has a small bract with an acute spreading limb, and a very shallow cup, almost indeed deficient anteriorly, emarginate or bi-lobed behind. Flowers oblong.

Calyx somewhat urceolate, broad and fleshy at the base, three-toothed.

Corolla, divided nearly to the base into three lanceolate-oblong erect cuspidate segments.

Stamens six, filaments subulate, fleshy at the base, united with the base of the corolla and to each other, into a fleshy annulus or narrow cup, in which will be found an oblong triangular rudiment of a Pistillum. *Anthers* oblong emarginate. *Pollen* triplicatum, plicis apicem utroque confluentibus.



Calamus ramosissimus Griff.

30. CALAMUS RAMOSISSIMUS.

TAB. CCVII.

(N. sp.) Spinis —— pinnis —— spadices supra-decompositi inermis pedunculo infra spathas ancipiti sursum teretiusculo arcolato, spathis (terminalibus) membranaceis scaphiformibus, spicis gracillimis, floribus (masculis) numerosissimis, corolla calyce oblongo breviter tridendato duplo fere longiore.

The description of this species is derived from a specimen: a male spadix (entire?) with very few flowers, and one terminal spathe.

Spadix unarmed, about two feet in length; the peduncle is flat and two-edged; the internodes long, compressed, not two-edged, and pitted from pressure of the flowers in the bud, its *branches* are the length of the internodes of the spadix, the lowest about nine inches long, spreading, and extremely divided; the largest *branchlets* of the lowest panicle are about four inches long. The uppermost *spathe* two inches long, membranous, acute, smooth, and boat-shaped.

Spikes about an inch long very slender, very flexuose with a scale-shaped bract at each flexure: rachis triangular. *Flowers* extremely numerous, suffulted by the above bract, and surrounded by a very shallow, oblique, oblong-ovate cup, emarginate behind. *Calyx* oblong, with three very short rounded teeth. *Corolla* not quite twice the length of the calyx, divided nearly to the base; segments oblong, rather obtuse.

Stamens six, united to the corolla as far as the base of its segments; the free part of the *filaments* long, subulate, and flat; *anthers* (included) obtusely sagittate. Rudiments of the *Pistillum* very long, nearly equalling the stamens, and composed of three subulate distinct bodies.

HAB.—Uncertain.

OBS.—This species approaches closely to *C. Jenkinsianus*, from which it appears to be distinguished by the comparatively long internodes of the spadix, the lowest being distinctly two edged, by the very slender spikes, the obsolete cup, and rather longer calyx. It is one of those which establishes some degree of affinity, at least in the inflorescence, with certain grasses. The male flowers moreover of this and many others, are not altogether unlike the flowers of such grasses as *Oryza* and *Blepharochloa*.

31. CALAMUS NUTANTIFLORUS.

TAB. CCVIII.

(N. sp.)—, Pinnis linearibus equidistantibus supra carina centrali et venis lateralibus duabus setigeris, spathis inermibus acuminatissimis secundis pedunculo spadicis (masculi) supra-decompositi inermi, ramis nutantibus dense ferrugineo-furfuraceis, spatharum (secundariarum) laminis majusculis, calycis dentibus obtusis villoso pehicillatis quam corolla sub-duplo brevioribus.

The description of this species is founded upon specimens: of three male spadices, and a portion of a young leaf.

The *petiole* in its pinniferous part is armed with ternate prickles.

The *pinnules* are equidistant, linear, about a foot long, and five lines broad, the upper surface with one central carina, bearing small bristles, and a lateral vein on each side with long bristles; the under surface smooth; margins with many appressed bristles.

Spadices about two feet long. *Peduncle* unarmed, apparently united to the neighbouring sheath, compressed, about three inches long to the first flower-bearing branch, below which it presents one annulate scar.

Spathes all unarmed, pushed as it were to one side, the lowest about eighteen inches long, one-keeled along the centre, all very much acuminated, and considerably longer than the spadix, (the tips about level-topped) coriaceous, striate, chesnut coloured internally, externally glaucescent, and much flatter than in almost any other species of the section. Flower-bearing branches each suffulted by one of the above spathes, very much branched, four or six inches long, towards the time of expansion nodding and secund.

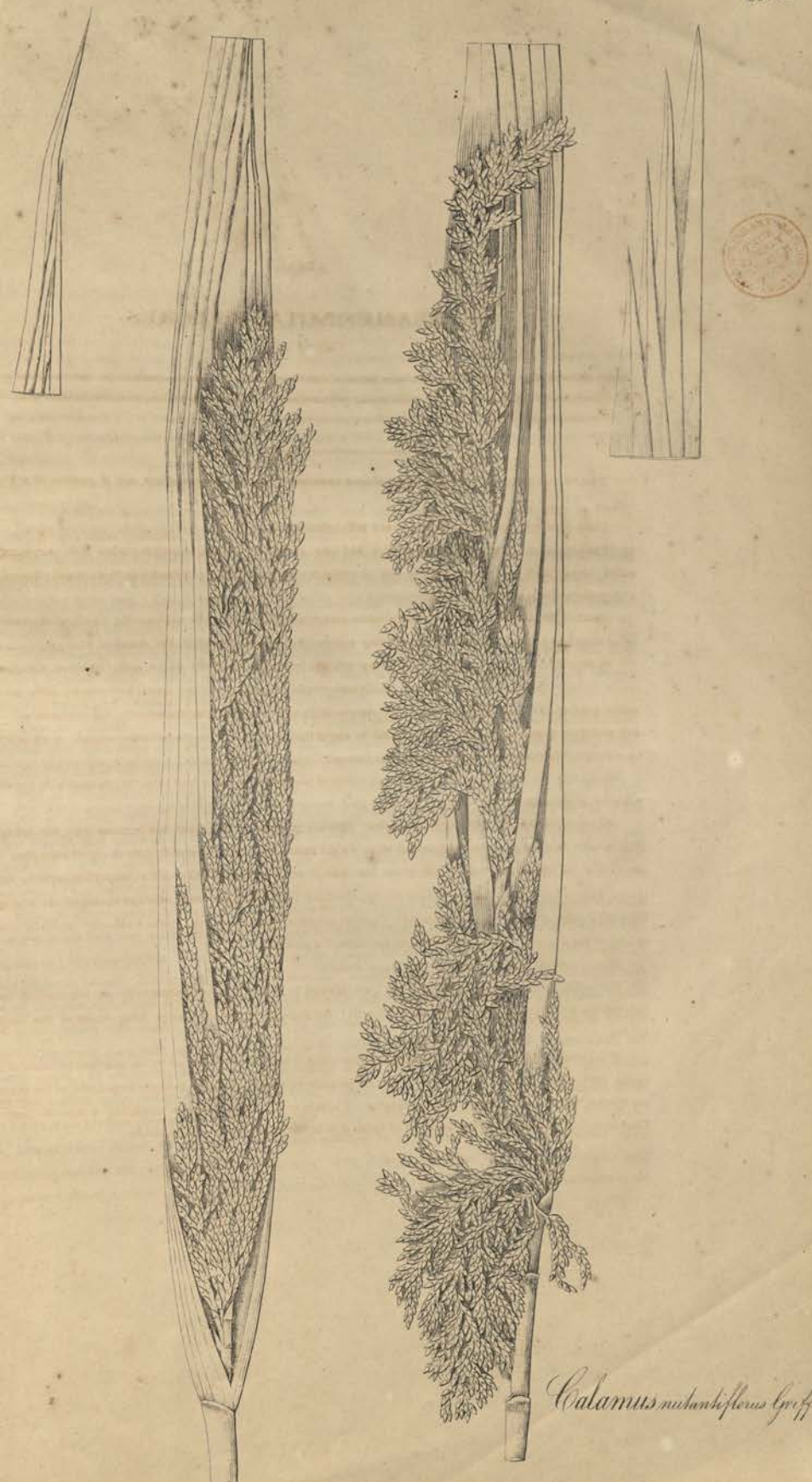
Spikes like the branches sprinkled with dark coloured tomentum, about an inch long, very flexuose with a single flower at each flexure.

Flowers distichous, sprinkled with tomentum. *Bract* amplectent, with a short membranous limb, the margins more or less ciliate, and the apex often tufted. *Cup* bidentate, membranous, about three times shorter than the calyx: margins ciliate, and teeth tufted. *Calyx* oblong, very coriaceous and much striate, three-toothed; teeth obtuse, with tufts of brown wool. *Corolla* oblong, one-third longer than the calyx, divided almost to the base into three oblong obtuse segments. *Stamens* six; *filaments* subulate, distinct, reddish; *anthers* obtusely sagittate, about as long as the filament. A small three-lobed rudiment of a *pistillum*.

HAB.—Assam, where it was found by Major Jenkins.

OBS.—This remarkable species, for which I am indebted to Major Jenkins, appears to be an intermediate form between the true CYMBOSPATHS and the PLATYSPATHS; the majority of the characters being those of the former section.

It is closely allied to the succeeding species, from which it is to be distinguished by the unarmed peduncle of the spadix, the unarmed spathes (the second one at least presents no spines), the comparatively large limbs of the secondary spathes, and the nodding very scurfy branches. I take it to be one of the forms exhibiting a representation of Gramineæ, to some Andropogoneous forms of which it is at first sight not altogether unlike.



Calamus nutantiflorus Griff.

32. CALAMUS JENKINSIANUS.

(N. sp.) Vaginarum spinis longis planis deflexis setis multis interspersis, petioli partis nudæ dorsalibus et marginalibus crebris mediocribus, partipinniferæ inferioris marginalibus crebris mediocribus, partis pinniferæ inferioris marginalibus ventralibusque cum aculeis dorsalibus uncinatis, aculeis partis superioris ventralibus solitariis et dorsalibus palmatis, pinnis equidistantibus linearibus (long. bipedalibus lat. 6-7 linealibus) supra carina centrali et venis lateralibus 2 setigeris, vena media subtus parce setulosa, spadicis elongati decompositi pedunculo crebre armato, spathis sub-apertis extima subplana bicarinata dorso spinas graciles deflexas interdum fere setiformes gerente, rostro sub-triplo breviore.

The description of this species is derived from specimens of an entire upper part of a male plant in flower, and two or three female spadices in flower, (after fecundation).

Climbing. Stem with the sheaths one inch and three quarters in diameter. *Sheaths* highly armed with long seriate flat brown spines, broader, but less hard than usual, deflexed, except those of the margins which are ascending; rather long thorny bristles occur mixed with these, or in distinct series. The edges of the larger spines are irregular from adhering brownish tissue.

Petiole transversely puckered at the base: the naked part five or six inches long, armed on the back with stout deflexed brownish spines, solitary, or, as in the lowest, in short series; numerous shorter and rather stronger ascending ones, along the margins solitary, placed or a few together.

These are continued into the pinniferous part, which is angular above, convex below, while the back of the same is armed with short strong conical claw-shaped prickles, which upwards appear to be reduced into a central series. *Flagellus* long, armed with the usual claw-shaped aculei.

Pinnules alternate, linear, the largest in the specimens nearly two feet long, eight or nine lines broad, the average size fourteen to sixteen inches long, and six or seven lines broad, cirrhosely acuminate, above with a central carina bearing bristles, and with a lateral one on either side with very long and often stout bristles; the under surface with a bristle here and there on the mid-vein; margins rough with numerous appressed bristles. The young petiole is covered with a brownish tomentum.

MALE. *Spadix* two feet long, adnate to the contiguous sheath. *Peduncle* between the lowest spathe and the axilla about two inches long, very much armed with black spines; above the lowest spathe quite unarmed. *Spathes* open level-topped? not over-lapping, probably spreading, except perhaps the lowest, which is attached about two inches, below the lowest branch. It is two feet long, linear-lanceolate, acuminated into a long beak, concave, scarcely boat-shaped, bicarinate on the back and armed with deflexed irregular rather slender blackish spines. The other spathes (one to each branch of the spadix) gradually diminish in size upwards, they are leathery or chartaceous, of chesnut brown colour inside, glaucescent outside, unarmed except the second, which presents a few weak thorns along two obscure carinæ. Flower-bearing *branches* several, ascending, longer than the internodes, decompound, much shorter than their spathes, except perhaps the uppermost. *Spikes* flexuose, more or less covered with rust coloured scurf; the lowest of each branch three or four flowered, the upper about two flowered.

Flowers oblong, oblique, situated at the flexures, each suffulted by an amplectent ovate-acute generally ciliate bract, and a cup with two pennicillate teeth next the axis. *Calyx* oblong, very striate, shortly three-toothed; teeth with short tufts of ferruginous hairs. *Corolla* rather more than twice the length of the calyx, divided nearly to the

base ; segments oblong, concave. *Stamens six* ; *filaments* subulate, fleshy, red, united by their bases to each other and to the petals. *Anthers* not seen, nor the rudiment of the *Pistillum*.

FEMALE. *Spadix* about the same length as the female : the lower part of the peduncle, however, is longer, and the armature as well as that of the outer spathe more slender, bristly and white ; the beak is also similarly armed. Flower-bearing *branches* flattened, so that the spikes are nearly bifarious. *Spikes* or more properly speaking racemes, two or three inches long, flexuose, also scurfy.

Flowers solitary at the flexures, the lowest placed on short stout stalks, the upper ones sessile. An amplectent acuminate blackish *bract* (at the base of the stalk), and two *bracteoles* to each flower : between the upper and larger sometimes cup-shaped bracteole, and that situated next to it, a gibbosity occurs as though there should be another flower. Apex of the upper bracteole pennicillate. *Calyx* barrel-shaped with three obsolete teeth. *Corolla* rather more than twice as long, divided nearly to the base into three linear-lanceolate erect segments. *Stamens* six ; *filaments* united to the base of the corolla and each other into a cup, (free) short, very broad, without anthers. *Ovarium* roundish-oblong, covered with scales, three celled. *Ovules* solitary. *Style* stout, with three rather long stout subrecurved branches, lamellar, and papillose inside.

Fruit. Specimens received from Major Jenkins (Tab. CLXXXVI. A. Fig, III.), are roundish whitish fuscescent, about the size of a musket bullet, surrounded at the base by the flattened split perianth, mammillately rostrate by the persistent base of the style. Scales of moderate size deeply furrowed with whitish margins and a brown intramarginal line. *Seed* roundish single, sometimes two, when they are sub-hemispherical, containing resinous dots. *Albumen* horny, ruminate. *Embryo* basilar.

HAB.—Assam, Major Jenkins.

OBS.—This species is closely allied to the preceding, and to *C. ramosissimus*; it is also one of the forms shewing that Dæmonorops is not to be generally considered a distinct genus from *Calamus*. Indeed this and the preceding species weaken greatly the distinctions between the two last sections, herein proposed,* particularly if, as I suspect, the spathes of this species are spreading. The upper part of the spadix might almost be mistaken for the same part of *C. ramosissimus*, and only differs from the same part of the section PLATYSPATHÆ, in the greater degree of contraction.

* PLATYSPATHÆ and CYMBASPATHÆ, of *Demonorops*.

33. CALAMUS GRANDIS.

TABS. CCX. A.B.C. TAB. CCXVI. Fig. III.

(N. sp.) Aculeis petiolorum dorsalibus uncinatis cum marginalibus (infra pinnas) inæqualibus interdum spiniformibus, pinnis glaucescentibus linear-lanceolatis (long. 18-20 uncialibus lat. 1½ uncialibus) supra 1-carinatis, vena media utrinque et margine cum vel absque setis, spathæ extimæ spinis planis latis deflexis, rostro æquante, calyce subintegro margine ciliato, fructibus globosis.

The description of this species is derived from specimens of an entire upper part of a male and female plant in flower, and several spadices in fruit. It is a stout Palm, the diameter of the *stem* (including the sheaths) being about two inches.

The *sheaths* are armed with broad, flat, generally very obliquely seriate, dark brown or black spreading, unequal spines.

The *leaves* are fifteen or sixteen feet in length.

Petiole swollen at its insertion, stout; in the lower two feet without pinnules, plano-convex, armed along the centre of the convex face towards the base, with a good many scattered rather deflexed small prickles; these upwards become hooked; along the margins they present a few broad flat short thorns pointing downwards, and within the margins a number of still shorter, generally solitary, ascending thorns; the pinniferous part, which is six to nine feet long, is armed below with strong hooked prickles generally placed in threes, these are continued into the *flagellus*.

Pinnules alternate, equidistant, of a whitish glaucous aspect linear-lanceolate, eighteen or twenty inches in length, one inch and a quarter in breadth, acuminated, at the apex into a long awl-shaped point, 1-carinate above, without setæ on either face or along the margins, or with the mid-vein setigerous on both sides, as well as the margins.

Spadices axillary, erect, fourteen or fifteen inches long, including spathes; peduncles adhering to the next sheath, free, scarcely an inch long, much armed towards the summit with short prickles.

Spathes several, coriaceous, more or less boat-shaped, one to each branch of the spadix. The outermost is the largest, bicarinate, and with the second and third entirely enclosing the others, armed on the back, especially the outermost, with flat ascending brown spines, tapered at the point (especially the outer) into a long flat beak, which is armed towards the base with a few thorns. The inner ones are generally unarmed, all more or less covered with rust-coloured scurf.

MALE. *Spadices* fifteen or sixteen inches long, of which the beak forms one half; branches decompound. *Spikes* short, scarcely exceeding half an inch in length, flexuose. *Cup* with the margins nearly entire, about three times shorter than the calyx. *Calyx* oblong, shortly three toothed, margins villously ciliate. *Corolla* cylindric-oblong; three, oblong, erect distinct as far as the base of the rudimentary Pistillum. *Stamens* six; *filaments* blood coloured, lower halves united into a fleshy mass, (free) subulate; *anthers* oblong-sagittate. *Pollen* one or three plicate. Rudiment of a *Pistillum* deeply three-lobed.

FEMALE. *Spadix* very stout with the internodes swollen at the centre, and having a corky appearance, all sprinkled with rust-coloured scurf. Branches of the female spadix stout, ascending. *Spikes* short, stout, similarly scurfy,

flexuose. *Flowers* on short stalks, the uppermost about sessile, with one bract at the base, and two bracteoles that close to the base of the flower being almost cup-shaped, entire. A niche exists between this and the back of the second, (which is sub-bicarinate) as though there should be another flower.

Calyx barrel-shaped, almost entire, striately veined; the margin fringed with reddish cellular processes. *Corolla* about one third longer than the calyx, ventricose from the middle downwards, divided nearly to the base into three erect, segments. Six rudimentary *stamens* line the lower half of the corolla.

Ovary oblong, three-celled, covered with scales, continued into a stout short cylindrical style, with three, long, revolute, horn-shaped branches, stigmatose on the inner face, which is also longitudinally furrowed. *Ovule* solitary.

Fruits more exposed than the flowers, the spathes being gaping, and at length these falling off, are quite exposed, surrounded at the base by the calyx and corolla, (the latter being generally split) terminated by the persistent base of style about the size and shape of a large marble; scales are of a light tawny colour with white edges, the central furrow narrow on either side of which the scale is more than usually gibbous.

Seed (immature) erect, the covering abounding with resin of a rich blood colour. *Albumen* horny-cartilaginous, very much ruminated. *Embryo* basilar.

HAB.—Malacca. Sent by E. Fernandez under the names *Rotang Sumambo*, and *Rotang Chry* ?

OBS.—This seems to me distinct from DÆMONOROPS *melanchætes*, Bl.* by the large leaves, the broad glaucous pinnules, the large spines of the outer spathes, and their beaks equalling, or exceeding them in length.

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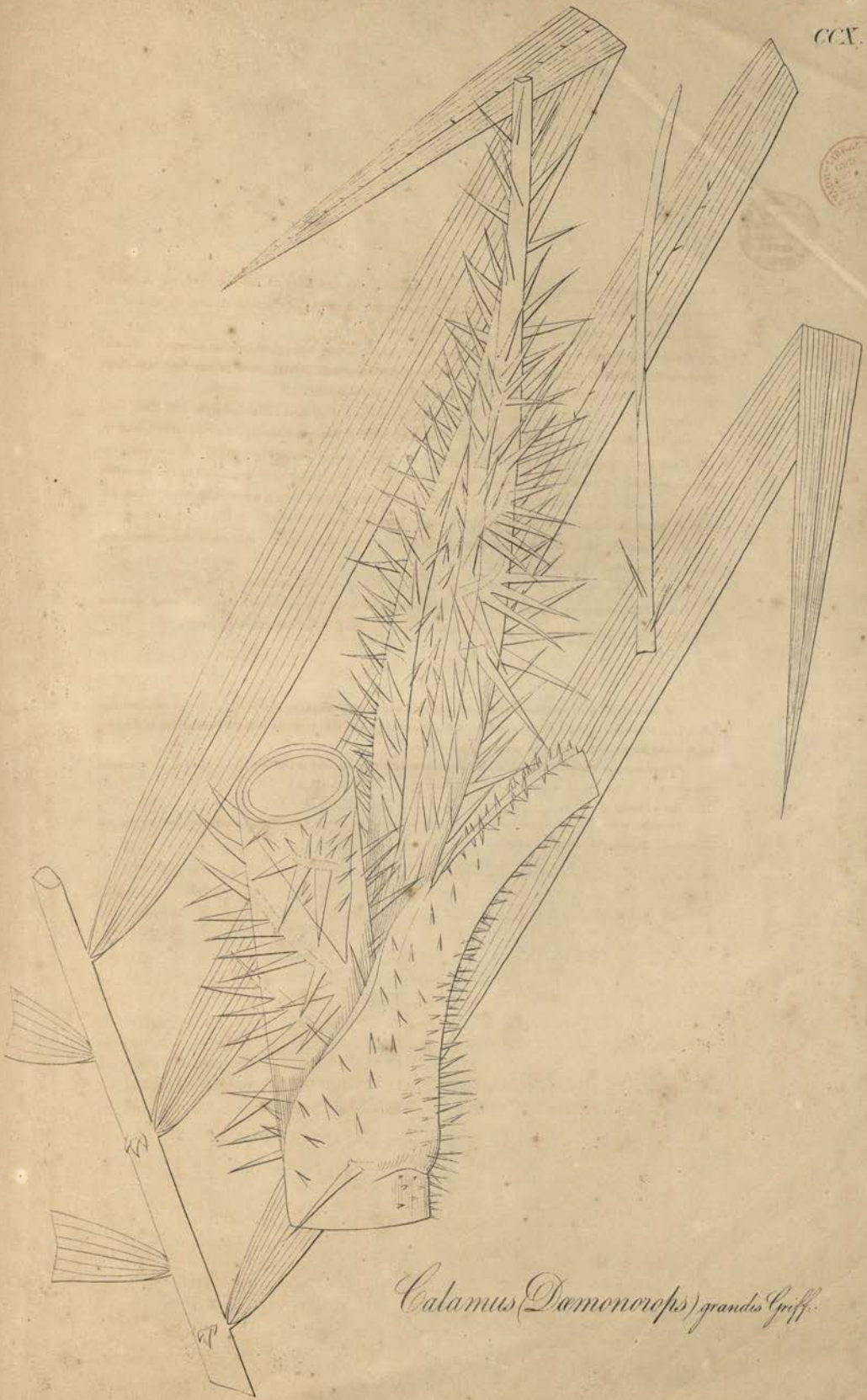
* *C. Melanochætes*, spinis petioli dorsalibus lanceolato-subulatis allis seiformibus marginalibus supra additis, pinnis æquidistantibus linearibus (long. subpedalibus lat. 3-4-linealibus) secus venam mediam et margines setoso-aculeolatis, spadicis pedunculo (infra spathas) spinis armato, spathis breviter rostratis extimis spinis parvis armatis. (Char. e MARTIO.)

"Palma juncus niger. *Rumph. Hb. Amb. 5. p.* 101. *t.* 52. Calamus niger, *Willd. Sp. Pl. 2. p.* 203. *Lam. Enc. 6. p.* 306." Dæmonorops melanochætes. *Bl. in Syst. Veg. ed. Schultes. 7. pt. 2. p.* 1333. MART. *Palm. p.* 198. *t.* 117, 125, *f.* 1.

HAB.—Penang.

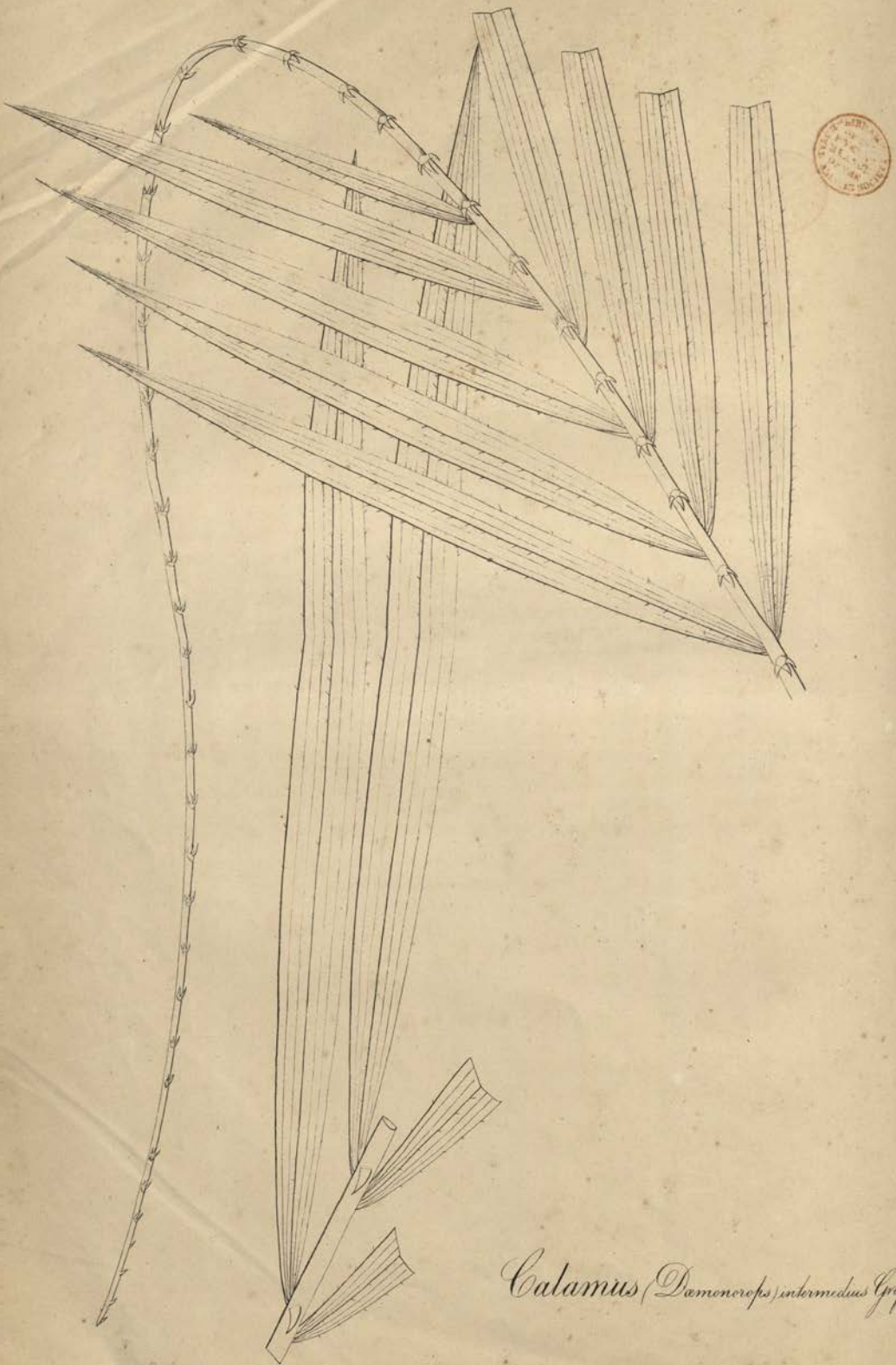
The spathes in plate 125, the only one I have seen, are represented as partially open, in which respect it approaches *C. mutantiflorus*, and *Jenkinianus*. The pinnæ are said to be 3-4 feet long.



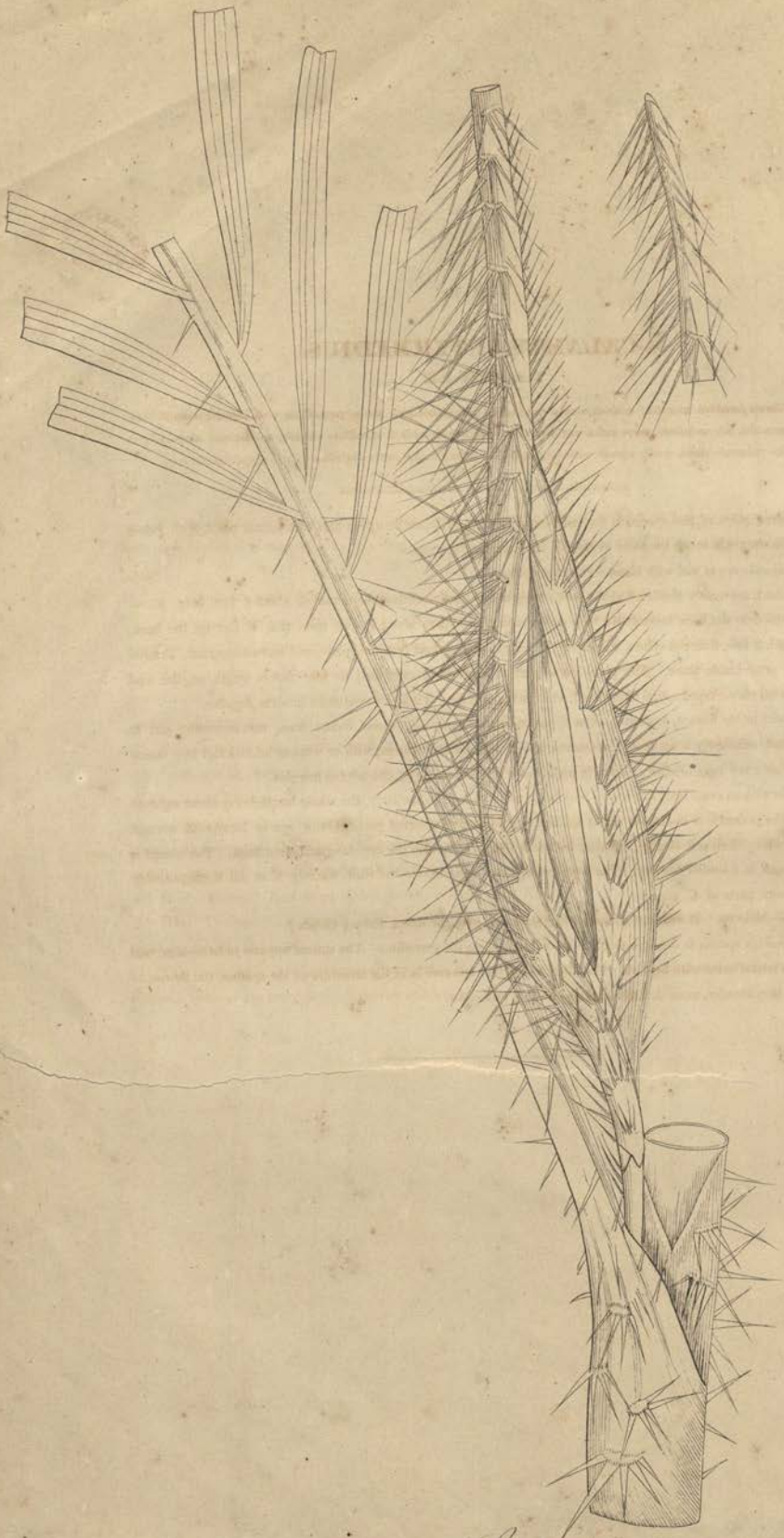
Calamus (Daemonorops) grandis Griff.

Calamus (Daemonorops) grandis Griff.

Calamus (Daemonorops) grandis Griff.



Calamus (*Dæmonorops*) *intermedius* Griff.



Calamus (Dæmonorops) intermedius.

34. CALAMUS INTERMEDIUS.

TABS. CCXI. A.B.

Aculeis petiolorum dorsalibus uncinatis, spinis et aculeis marginalibus inæqualibus infra pinnas superadditis, pinis lineari-lanceolatis (long. 15-uncialibus, lat. uncialibus) supra carina una cum vel absque setis et venis 2 lateralibus setigeris, subtus vena media setigera spadicis pedunculo inermi, spathis externis spinis longis gracilibus deflexis armata, rostro longissimo.

The description of this species is derived from specimens of an entire upper part of a female plant with young fruit. The stature is much the same as that of the preceding species.

The *sheaths* are armed with black seriate flat spines.

Petioles transversely puckered at the base; their naked portion (below the pinnules) about a foot long, plano-convex, armed on the back towards the base with scattered prickles; about a span from this, it has on the back, solitary, rather long deflexed spines, and along the margins some stout deflexed spines, and more numerous, slender, ascending ones inside these. The pinniferous part is from three-and-a half to four feet in length, angular, and provided with claw-shaped aculei along the lower convex surface. These are continued into the *flagellus*.

Pinnules rather distant, scattered, often opposite, linear-lanceolate, fifteen inches long, not exceeding one in breadth, and subulately acuminate, glaucescent, above with a central carina, with or without bristles and two lateral veins bearing a few long bristles; mid-vein underneath bristle-bearing as also are the margins.

Spadix with an ovate body and a very long beak, twice as long as the body, the whole length being about eighteen inches. The peduncle is unarmed; about an inch long in its free exserted part. Outer *spathe* bicarinate, covered with very long deflexed, slender, subulate brownish thorns, as is also the very long and stout beak. The second is thickly armed in a similar manner. The branches of the spadix flowers and fruit, scarcely if at all distinguishable from the same parts of *C. grandis*.

HAB.—Malacca. It was sent to me by E. Fernandez, with the name, *Rotang Chrysa ?*

OBS.—This species is distinguishable with difficulty from the preceding. The stature appears to be smaller, and it presents lateral veins with bristles. The chief distinction however is in the armature of the spathes, the thorns of which are very slender, more deflexed, and much more numerous.

35. CALAMUS LEWISIANUS.

TABS. CCXII. A.B.

Aculeis petiolorum dorsalibus uncinatis, marginalibus (infra pinnas) inæqualibus conico-subulatis sæpius binatis vel ternatis superadditis, pinnis confertis linearibus (long. 13-15 uncialibus lat. 5-6 linealibus) supra carina una et venis 2 setigeris subtus setis nullis, spathæ extimæ spinis planis subulatis gracilibus.

The description of this species is derived from specimens of an entire upper part of a female plant. It is a less stout species than the preceding, the diameter of the stem, including the sheaths, being scarcely more than an inch.

The *sheaths* are armed with solitary or seriate, long flat black spines; margins revolute.

Petiole much swollen at the base, and there armed with scattered, deflexed shortish thorns; below the pinnules are about a foot long, plano-convex, armed along the back with a few solitary hooked prickles, along the margins with short, conical-subulate, solitary, binate or ternate thorns. In the pinniferous parts it is obtusely triangular, armed along the convex lower face with hooked and solitary prickles which, upwards gradually become palmate towards the extremity.

Pinnules æquidistant, approximated, linear, thirteen or fifteen inches long, five or six lines broad, bristle-pointed upper surface with one carina and a lateral vein on either surface setigerous; under surface smooth; margins rough, with appressed bristles.

Spadices oblong, including the beak of the outer spathe six or nine inches long; peduncle below the spathes armed with flat spines. Outer *spathe* bicarinate, armed with rather weak, deflexed, long black spines, often so slender as to become bristly. Second spathe with about two rows of slender thorns; the rest unarmed.

HAB.—Penang. Sent to me by Mr. Lewis, with the name *Kichum*.

OBS.—The spadix is scarcely distinguishable from that of the preceding, but in the specimen the branches are more slender, and less scurfy.

This is extremely akin to the preceding species, the thorns however of the lower naked part of the petioles are different, those of the margins much shorter and fewer. The pinnules also differ.

Calamus Lewisianus, Griff.

36. CALAMUS ANGUSTIFOLIUS.

TABS. CXCIII. A.B.

Spinis vaginarum paucis aculeis plurimis interspersis, aculeis petiolorum solitariis crebris sparsis, inter pinnas inferiores dorsalibus uncinatis ventralibus dentiformibus, pinnis confertis linearibus (long. 8-10 uncialibus lat. 3-4 linealibus) carina et venis 2 lateralibus utrinque setigeris, spathæ extima aculeis istis vaginarum similibus, rostro inermi dimidio breviore.

The following description is derived from specimens of a complete upper part of a male plant in flower.

It is a rather more slender species than the preceding.

The *sheaths* are thickly armed with unequal, short, flat, scattered, solitary thorns.

Leaves five, or five and half feet in length.

Petiole puckered transversely at the base; below the pinnules three or four inches long, plano or concavo-convex, armed on both faces, especially the under, with scattered, unequal, short, straight or curved thorns; in the pinniferous part angular-convex, lower face with hooked palmate prickles, the upper part with scattered small straight prickles.

Pinnules equidistant, very numerous, very narrow, eight or ten inches long, and three or four lines broad, tapered into a long bristle, upper face with one central carina, and two lateral carinulæ setigerous, the under face with the same, or with the central carina or rib only bearing a few bristles; margins bristly.

Spadix (with the spathes) narrow oblong; peduncle rather slender, somewhat armed. Outer *spathe* with its beak, which is about half the length, about fourteen inches long, bicarinate, armed (except the beak) with thorns like those of the sheaths, the upper ones are rather the longest. Beak *quite* flat with a tendency to become a cirrhus. Second *spathe* obsoletely bi-carinate, with a very few small thorns about the middle of its back. Branches of the spadix pressed into a thick oblong mass; lower divisions decompound.

Spikes slender, an inch long, very flexuose, with a single flower at each flexure, sprinkled with rust-coloured scurf. A small amplectent *bract* and a *cup* to each flower. *Flowers* eight or ten to each spike, small, oblique. *Calyx* oblong-cylindric, three times longer than the cup, with three small teeth. *Corolla* three times as long as the calyx, divided nearly to the base into three erect segments. *Stamens* six; *filaments* united into a cup; *anthers* linear-sagittate. *Pollen* yellow. A rudiment of a *Pistillum* hidden in the cup of the filaments.

HAB.—Malacca Province. Malayan name, *Rotang Ghittah*.

OBS.—This is in all respects a very distinct species, especially so from the armature of the sheaths and petioles and outer spathe, as well as the narrow short pinnules.

I am inclined to place near this a very distinct species of Calamus, lately received from my collector E. Fernandez, with the name *Rotang Pajare*, and which by its excessive armature and degree of fasciculation of the pinnæ, differs from all the others I have yet met with. The following is a description of it:—

Stem with the sheaths about an inch in diameter. *Sheaths* with very oblique mouths, excessively armed with the usual seriate thorns, of which some series are very large, others much smaller, some almost bristle-shaped. The larger ones deflexed: general colour of the older ones blackish from a whitish base. *Petiole* below the pinnæ about two feet long, much channelled towards the base, much armed with stout, straight, unequal thorns, of these the lowermost are like those of the sheaths, and exist on the ventral surface; above, they are stout, subulate, but much shorter,

and are confined to the dorsum and margins. In the pinniferous part they are hooked, and confined to the dorsum and margins. In the pinniferous part they are hooked, and confined to the same part, towards the *flagellus* they become palmate. *Pinnæ* very numerous in large subopposite distant fascicles, linear-lanceolate, 1 foot long, eight or nine lines broad, acuminate, with five bristle-bearing carinæ above, underneath smooth, apex generally, bristle-tufted. Length of leaf exclusive of the *flagellus* about ten or eleven feet.

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37. CALAMUS HYGROPHILUS.

TAB. CCXIII. C.

Aculeis petioloruum infra pinna dorsalibus sparsis, cum marginalibus longioribus infra pinnas dorsalibus aculeatis, pinnis æquidistantibus linearibus (long. pedalibus lat. semuncialibus) supra carina et verus duabus longe setosis, subtus setis paucis ad venam mediam spadiceo attenuati bipeduli spatha extima spinis armatis rostro subæquante.

This species is described from a specimen of the upper part of a male plant in flower. It is a stout palm: the diameter of the stem and sheaths $1\frac{1}{2}$ inch. *Sheaths* armed with broad flat spines, spreading or sub-deflexed, solitary yet disposed in the usual oblique lines. The *petiole* where it unites with the sheath, is so puckered as to form half a complete thick ring round the sheath; armed about this part along the centre with a few short prickles: it is about six inches long before it become armed on the convex dorsum with scattered prickles, on the margins with stoutish but short spines, with its flat ventral face unarmed in the pinniferous part, it is armed along the centre of the dorsum with hooked aculei, which become palmate towards the upper extremity, and are continued into the flagellus, a few marginal ones being found below. The young petiole is ferruginously woolly.

Pinnules equidistant linear, about a foot long, five lines broad, cirrhoso-acuminate, above with a central carina, and two lateral veins bearing long bristles, underneath with small bristles along the mid-vein, margins and acumen bristly.

The *peduncle* of the spathes is adnate to the next for a short distance above the mouth of its own sheath, almost unarmed compressed.

Spadix nearly two feet long.

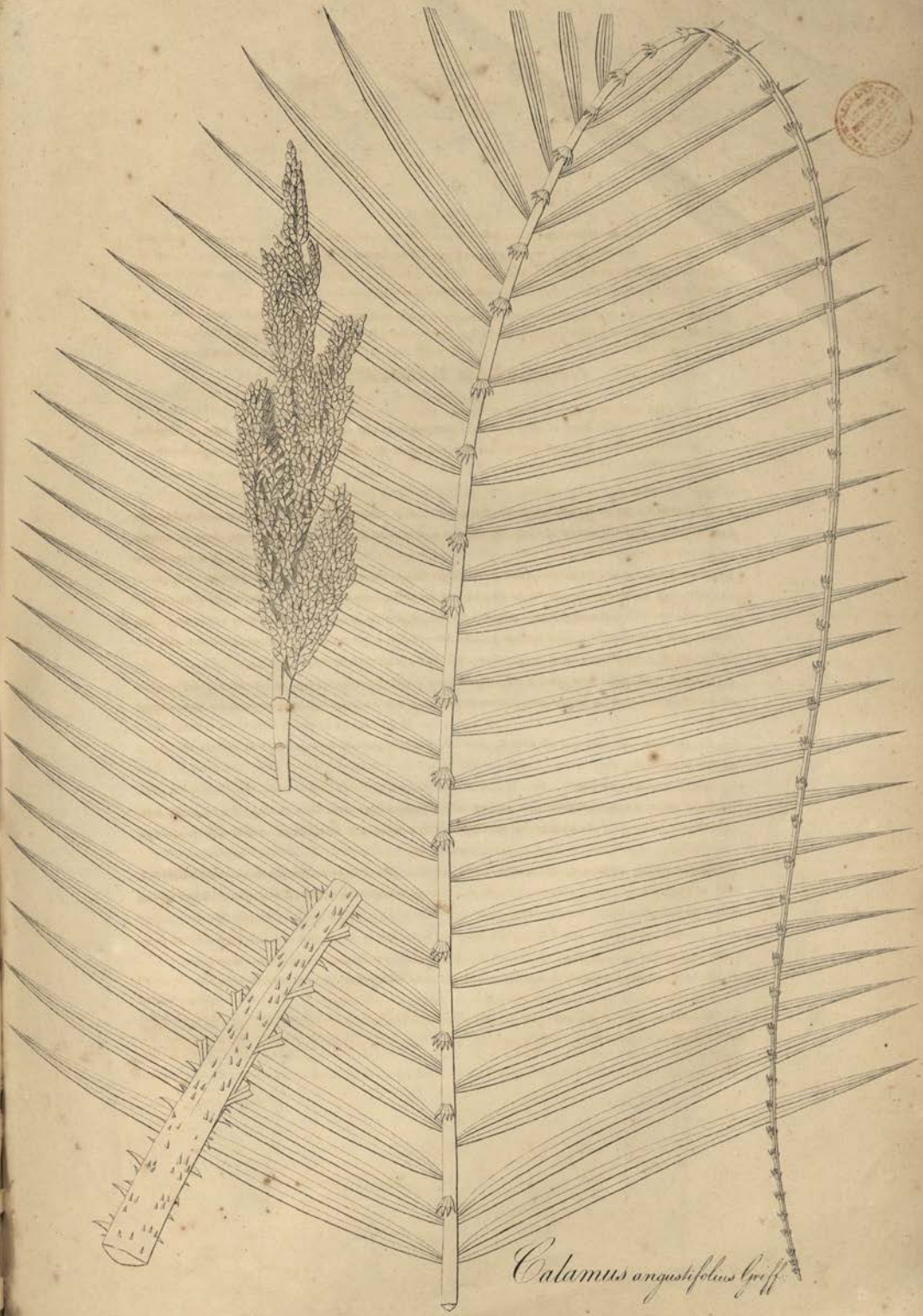
Outer *spathe* arising just above the *exsertion* of the peduncle, armed on the back where it is bicarinate with spines similar to those of the sheaths but narrower, rostrum about half of its length armed with longer and narrower spines, second *spathe* leathery, unarmed as are the rest.

Flowers entirely enclosed in the spathes, very numerous. *Spikes* short flexuose few-flowered, sprinkled with scurf, an amplectent scale-shaped bract under each *flower*. *Cup* rust-coloured shallow, almost entire. *Calyx* oblong short, with three short teeth. *Corolla* rather more than twice as long, divided nearly to the base into three oblong erect segments. *Stamens* six, united among each other and to the base of the corolla, *filaments* (free) subulate from a stout base, *anthers* linear sagittate. *Pollen* yellow. Rudiment of the *Pistillum* a deeply three lobed body.

HAB.—Sent from Malacca by E. Fernandez, with the name *Rotany Ayer*, Ayer is water in Malay

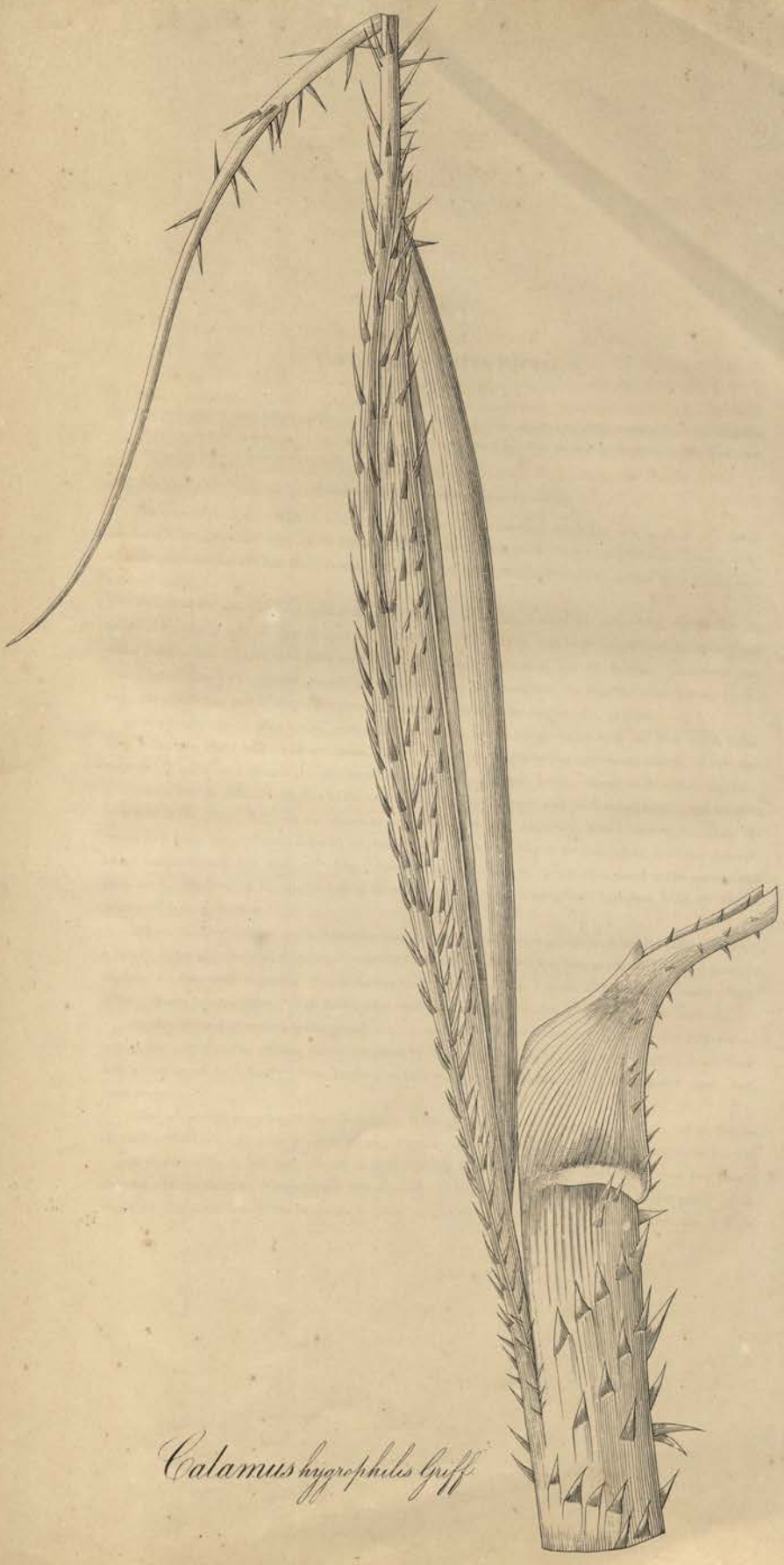
OBS.—This species has to a considerable degree, the armature of *C. grandis*.

The pinnules however are quite different, being furnished with stout long bristles on the upper surface. This and the lengthened narrow oblong, or fusiform spadix will at once distinguish it from all, except perhaps *Rotang Kirtong*.



Calamus angustifolius Griff.

Calamus angustifolius Griff.



Calamus hygrophilus Griff.

38. CALAMUS MONTICOLA.

TABS. CCXIV. A.B.C.

Spinis vaginarum longis subulatis deflexis, petiolorum (superiorum) marginibus inæqualibus et aculeis dorsalibus uncinatis, pinnis æquidistantibus nearibus (long. 10-18 uncialibus lat. 6-8 linealibus) supra carina et venis 2 lateralibus setigeris subtus glabris, spatha extima secus carinas duas spinis gracilibus deflexis armata.

The description of this species is derived from specimens of the complete upper part of a female plant in flower and fruit. It is erect, about eight feet in height. The petioles of the upper leaves only, flagelliferous. *Sheaths* armed with long deflexed flat subulate black thorns, disposed in lines, but individually distinct; surface dark brown from adhering scurf.

Petioles of the *upper leaves* gibbous at the base, the lower naked part is about ten inches long, concavo-convex, armed with a dorsal row of stout hooked prickles, and along the margins, with long, generally deflexed spines, and within these towards the base, with short ascending ones; these are extended into the flagellus; pinniferous part convex below, armed with hooked palmate prickles, these are continued into the flagellus, which is about 1½ foot long; the pinniferous part of the petiole above, is convexly trigonal, or roundly angular, unarmed.

Pinnules alternate, or often sub-opposite, equidistant, linear, ten or eleven inches long, six lines broad, subulately acuminate, above with the central carina and two lateral veins bristle-bearing, underneath smooth, except that the mid-vein below bears towards the apex numerous small bristles, margins bristly. *Lower leaves* without flagelli.

Spadix with its peduncle adhering to the next sheath, unarmed, covered with dark brown scurf. *Spathes* more open than in the others; the outer one sixteen or seventeen inches long, bicarinate, armed between and along the carinæ with weak, long, subulate, deflexed, flat, black spines; the beak is nine or ten inches long, erect, flat, sparingly armed except towards the apex, with long deflexed subulate bristles; its surface when young is also covered with black scurf. Branches of the spadix two or three inches long, included, ascending; ferruginously scurfy. *Spikes* few-flowered, stout, flexuose.

Flowers on short stalks or sessile, bracteate, inner bracteole cup-shaped, and between it and the outer bracteole is a niche. *Calyx* subcylindrical, minutely three-toothed. *Corolla* scarcely twice as long as the calyx, divided nearly to the base into three erect segments. Sterile *stamens* six. *Ovarium* oblong, covered with denticulate scales: three-celled. *Ovules* erect, solitary. *Style* three-partite nearly to the base; branches revolute, stigmatose internally.

Spathes of the fruit-bearing spadix opened out, or none. *Fruit* surrounded at the base by the flattened-out, more or less split perianth, globose, shortly cuspidate by the style, of the size of an ordinary marble; scales tawny with a dark brown intro-marginal line; longitudinal furrows, as it were continuous. *Seed* (immature) erect; tegument fleshy.

HAB.—Somewhat gregarious in thick Forests on Gonoong Miring, an off-set of Mount Ophir, at an altitude of 1500 or 2000 feet. It is also found at Penang, where a specimen subsequently met with is described as follows.

A slender palm, in the specimen six or eight feet high, stem weak, probably climbing, four or five lines in diameter with the sheaths. Sheaths armed with obliquely seriate weak brown black spines the longest nearly 1½ inches long. The naked base of the petiole ten or eleven inches long, puckered at the very base where also it is un-

armed, margins with a row of shortish weak spines, along the dorsum with a row of aculei commencing a little above the base, sometimes these resemble the marginal ones.

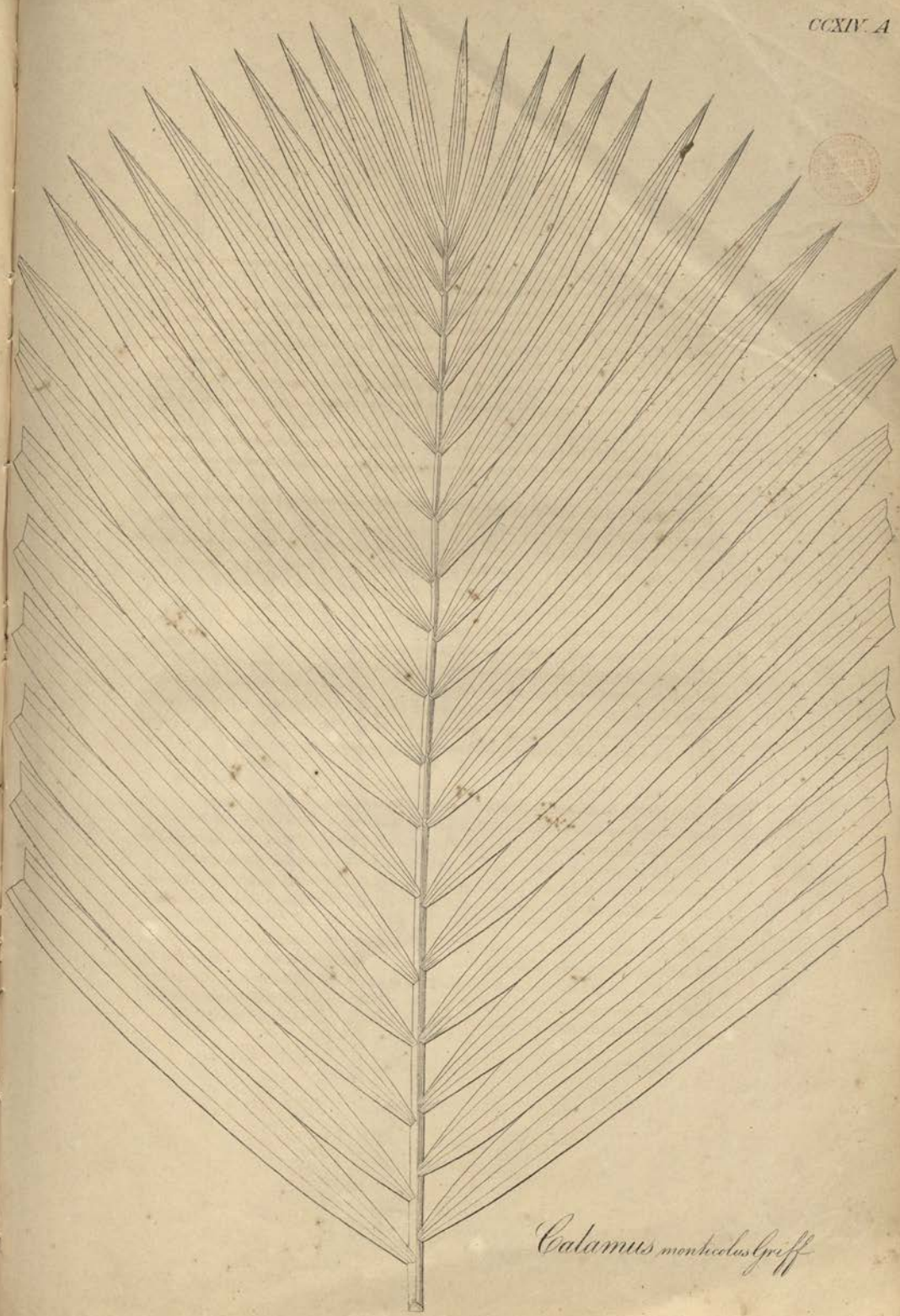
Leaf with the 1-1½ foot flagellus about five feet long, the outline the laminiferous part which is 1½ foot long ovate, or lanceolate-ovate. Pinnæ equidistant, linear, eight or ten inches long, four lines wide above, one central keel and two veins setigerous, margins setigerously ciliate; underneath the mid-vein is shortly setigerous, points subulate-acuminate, hispid, a row of aculei very short along petiole continued into flagellus towards which they become clawed.

Spadix. Peduncle adnate to sheath rather high up, slightly armed. Outer spathe about a span or foot long, armed with long seriate weak deflexed spines. Rostrum equal to or longer than the body of the spathe, unarmed, inner spathe unarmed.

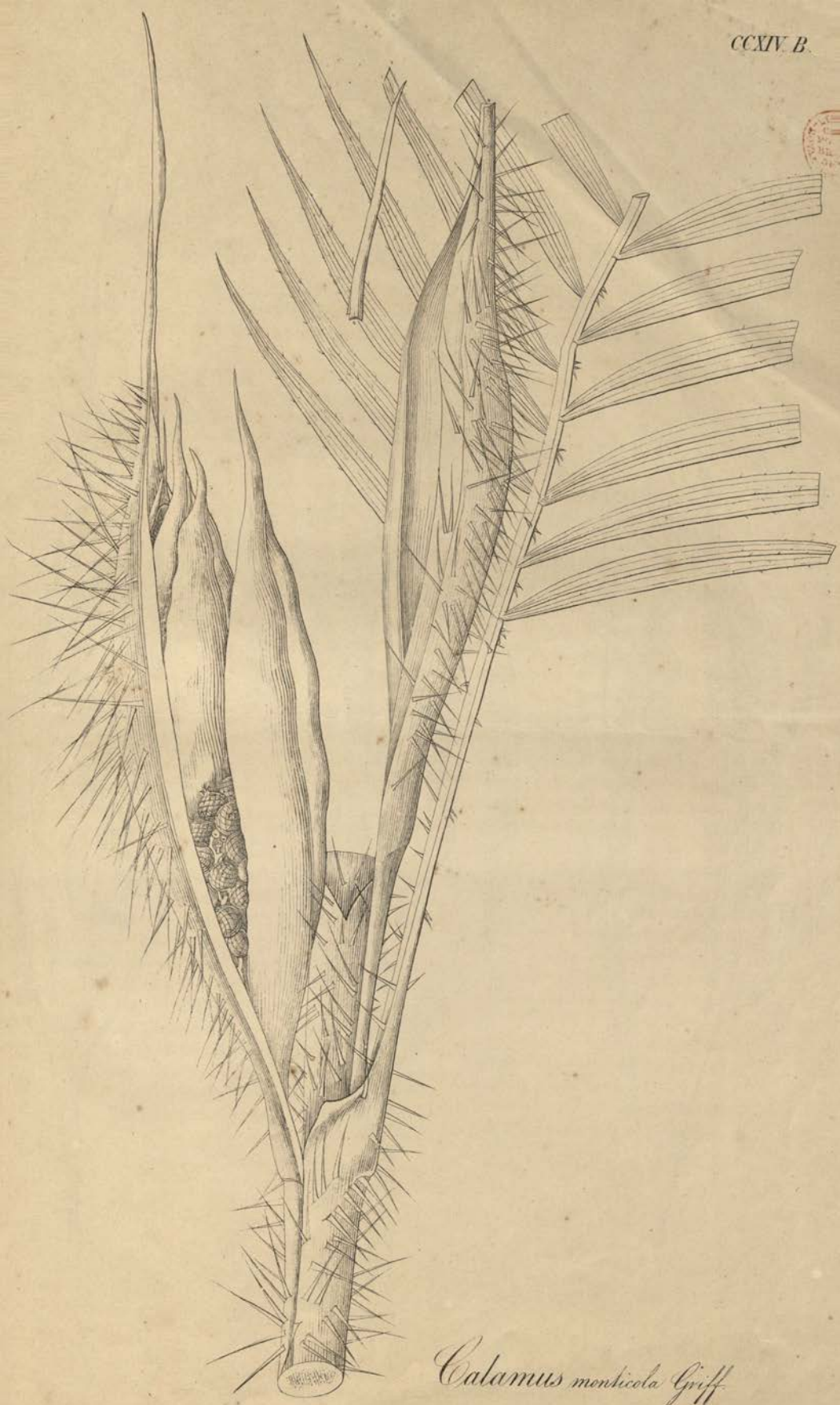
Fruit partly concealed by the now spreading or bellied-out spathes, the size of a marble, small, (five lines in diameter) scales green with white margins and a brown into-marginal line, three reflexed stigmata at the apex, at the base the perianth.

Seed immature, pellucid punctate here and there, without a raphe? tegument thick albumen ruminate not acid.

Penang Hill: 4th January, 1845, *about half way up.*



Calamus monticolus Griff.



Calamus monticola Griff

Calamus (*Daemonorops*) *Monticola Griff.*

39. CALAMUS CALICARPUS.

TABS. CCXV. A.B.C.D.

Scandens? petiolis infra pinnas pedalibus, spinis marginalibus longis et aculeis dorsalibus armatis, intra pinnas aculeis dorsalibus palmatis, pinnis æquidistantibus linearibus (long. 12-13 uncialibus lat. 4-5 linearibus) supra carina 1 et venis 2 setigeris subtus vena centrali tantum setigera, calyce (fl: fem:) oblongo-ovato breviter tridentato.

The description of this species is taken from the following specimens: viz. the entire upper parts of male and female plants both in flower and fruit. Scandent? Diameter of the *stem* (with the sheaths) about one inch.

Sheaths covered with rust-coloured scurf, and highly armed with very numerous, long, ascending, rather slender very unequal spines, generally disposed in series.

Petiole below the pinnæ about a foot long, channelled, convex, armed towards the base, where it is not gibbous or puckered, with spines like those of the sheaths; towards the pinnæ they become much fewer and are chiefly confined to the margin, those of the dorsum more or less aculeiform, In the pinniferous part which is 5½ to 6 feet long; the prickles are confined to the lower convex surface, are hooked and generally ternate or palmate; these are continued into the *flagellus*.

Pinnæ equidistant, approximate, very numerous, linear, twelve or thirteen inches long, four or five lines broad, distinctly acuminated into a long bristle: the upper surface with the central carina and two lateral veins setigerous; under surface with more numerous smaller bristles along the mid-vein, the lateral veins with or without bristles; margins with bristles. The leaves towards the apex of the stem small, with comparatively very long flagelli.

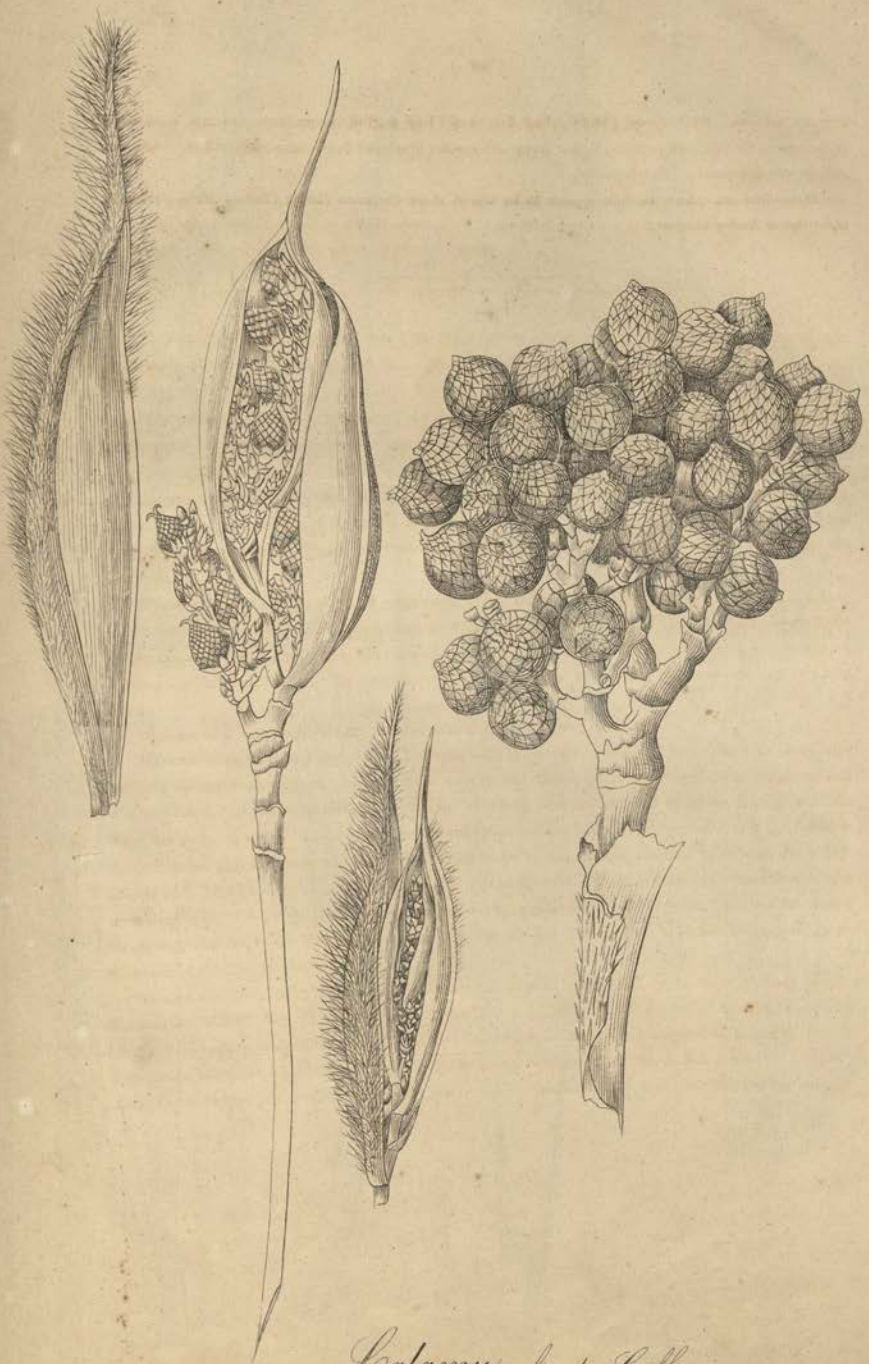
Spadices with compressed, shortly exserted peduncles, bearded along the edges.

MALE. *Spadices* much branched, varying in length, being in some fifteen or sixteen inches long, in others also including the spathes scarcely six, and then much more ovate. Outer *spathe* in the exposed part densely covered with grey-brown bristly hairs, an inch or one and half inches long, these are continued up above the middle of the beak, the moderate apex of which is smooth. Second spathe bearded chiefly along the middle, as is also the third. *Spikes* flexuose, with some rust-coloured scurf, a single flower at each flexure, suffulted by a bract and a cup. *Flowers* (Tab. CCXVI. Fig. VI.), as usual oblique. *Calyx* nearly cylindrical, three times longer than the cup, with three short teeth. *Corolla* divided almost to the base, not quite twice as long as the calyx. *Stamens* six, united among each other and to the base of the corolla; *filaments* subulate from a stout base; *anthers* linear-sagittate. Rudiment of *Pistillum* minute, tripartite.

FEMALE. *Spadices* shorter, the upper ones not more than four or six inches long, branches generally simple. *Flowers* (Tab. CCXVI. Fig. V.) with one bract and two bracteoles, a callous looking space on one side between the lower and the uppermost almost cup-shaped bracteole. *Calyx* ovate, the teeth somewhat tufted at the points. *Corolla* three-partite below the middle: ovate from the middle downwards, segments erect. Sterile *stamens* six. *Ovarium* oblong-ovate, covered with scales, three-celled; *ovula* solitary; *style* stout, short, with three long revolute inwardly

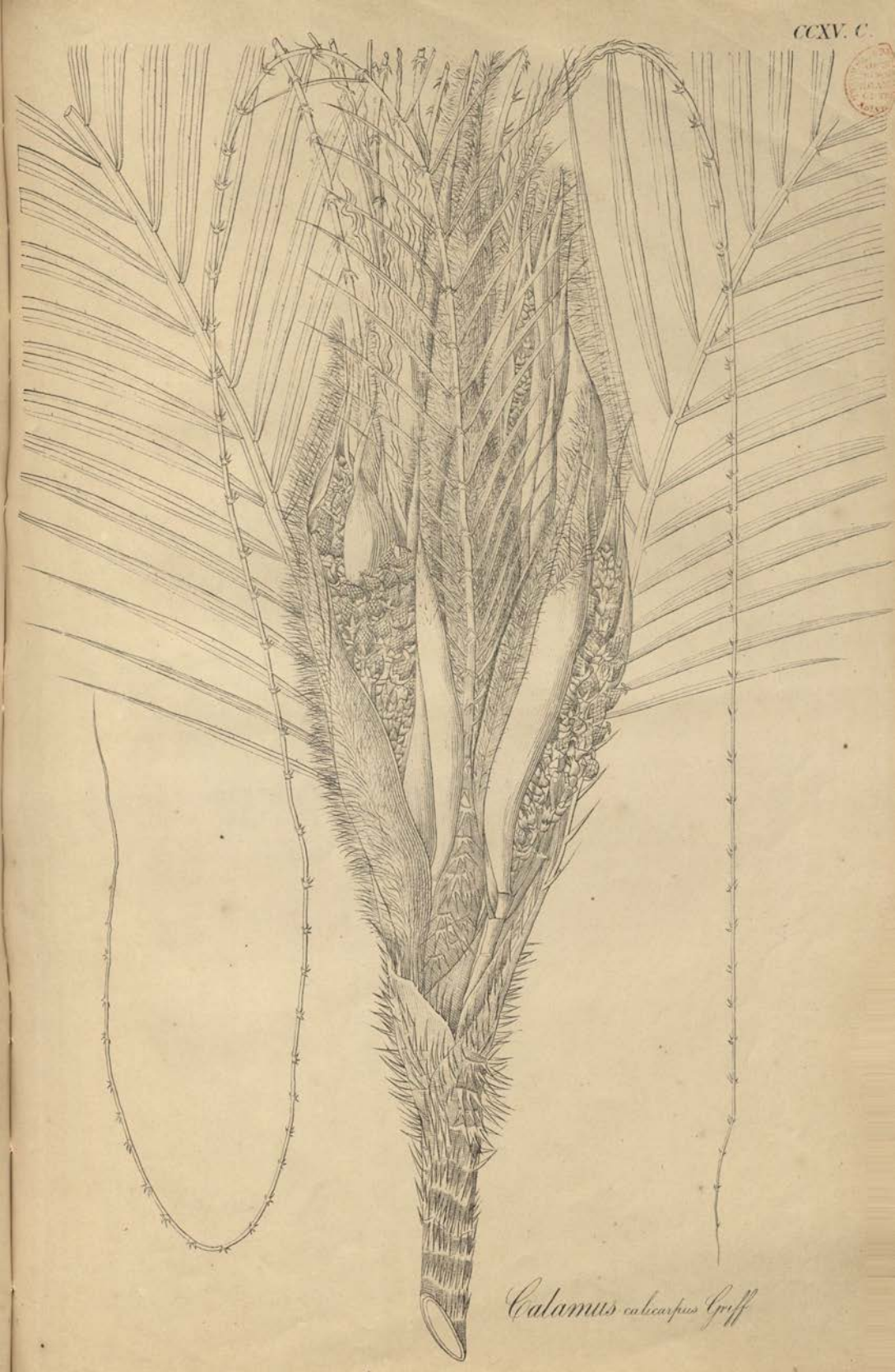
stigmatic branches. *Fruit* exposed, globular, about the size of a large marble, mammillately cuspidate, surrounded at the base by the persistent perianth; scales tawny with a rather broad dark brown intro-marginal line. *Seed* erect. *Albumen* deeply ruminate. *Embryo* basilar.

Hab.—Malacca, where the male appears to be known under the name *Rotang Chochoor Minia*, the female under that of *Rotang Chochoor*.

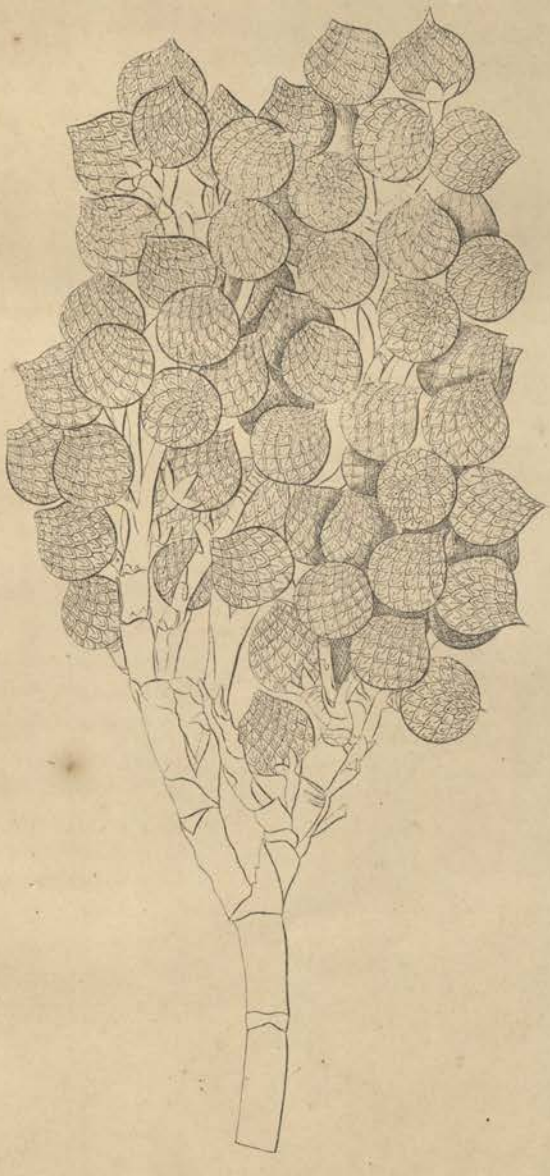


Calamus calicarpus Griff.

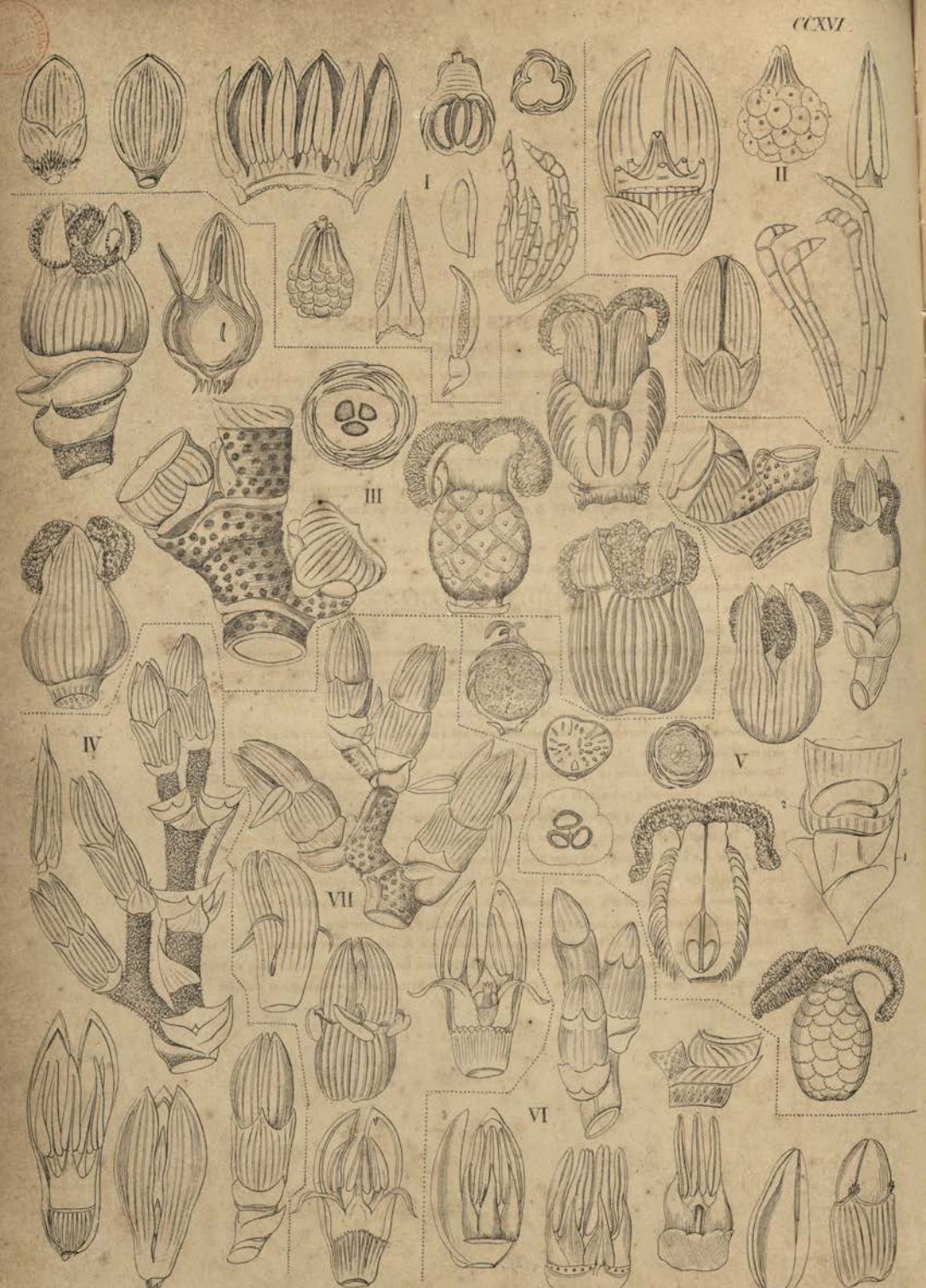
Calimus Calicarpus



Calamus calocarpus Griff



Calamus (Daemonorops) calicarpus Griff.



I *Calamosagus schrugeri* II *Calamosagus laciniosa* III *Calamus grandis*.
IV *Calamus leptopus* V. VI *Calamus calliacarpus* male & female VII *Calamus petiolaris*.

40. CALAMUS PETIOLORIS.

FIG. VII. TAB. CCXVI.*

Erectus, petiolorum parte nuda sub-7-pedali teretiuscula inferne spinis oblique seriatis armata superne aculeis dorsalibus uncinatis et marginalibus (paucis) dentiformibus vel omnino inermi, inter pinnas cum vel absque aculeis dorsalibus, pinnis confertis æquidistantibus linearibus (long. 15-17 uncialibus lat. 6-7 linealibus) supra carina et venis 2 setigeris subtus vena centrali setulosa, cupula et calyce ovato-oblongo obsolete tridentato.

I have two forms of this, which may hereafter be found to be distinct, particularly as the characters of this section of Calamus would seem to depend in a considerable degree on the armature of the petioles. I subjoin descriptions of both.

VAR. α. The description of which is taken from a leaf and male inflorescence.

Erect, armature of the *sheaths* the same as that of the preceding species.

Petioles below the pinnules very long, those of the apex of the stem alone produced into flagelli, the pinniferous part about seven feet long, armed below the middle on the convex under face, with rather small palmate hooked prickles.

Pinnules very numerous, approximate, linear, fifteen or seventeen inches long, six or seven lines broad, acuminated into long bristles, upper surface with one carina bearing bristles towards the apex, and two lateral veins more bristly, under surface with many smaller bristles along the mid-vein; margins bristly. The upper flagelliferous leaves and inflorescence are exactly like those of small specimens of the preceding.

Spikes very flexuose, ferruginously pubescent, one bract and a cup to each flower. *Calyx* oblong with three minute teeth, sometimes ciliate. *Corolla* rather more than twice the length of the calyx, divided below the middle into three oblong segments. *Stamens* six; *filaments* united to each other half way up, during flowering reflexed; *anthers* linear-oblong. A three-lobed rudiment of a *Pistillum*.

VAR. β. The description of which is derived from specimens an entire leaf and upper part of a male plant in flower. The armature of the *sheaths* is like that of *C. calicurpus*. *Petiole* seven feet in length to the *lamina*, which is about four and a half feet long: the upper ones only are extended into flagelli; below, the pinnules are subcylindrical, armed in the lower two feet, here and there, with oblique nearly complete series of ascending short flat subulate thorns, becoming gradually fewer upwards; four feet from the base quite unarmed as also among the pinnules, where it is convex below, angular or bifacial above. *Pinnules* as in the preceding.

Inflorescence the same as in the preceding, but the *spadices* and the *spikes* are more tomentose, much longer, and the lowest spathe reaches to the axilla. *Flowers* much the same, but the *calyx* is cylindric-oblong with three acute teeth, the *cup* also has three acute teeth. *Corolla* divided nearly to the base, twice the length of the calyx.

HAB.—Malacca.

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41. CALAMUS (DÆMONOROPS KIRTONG) ACANTHOPIS.

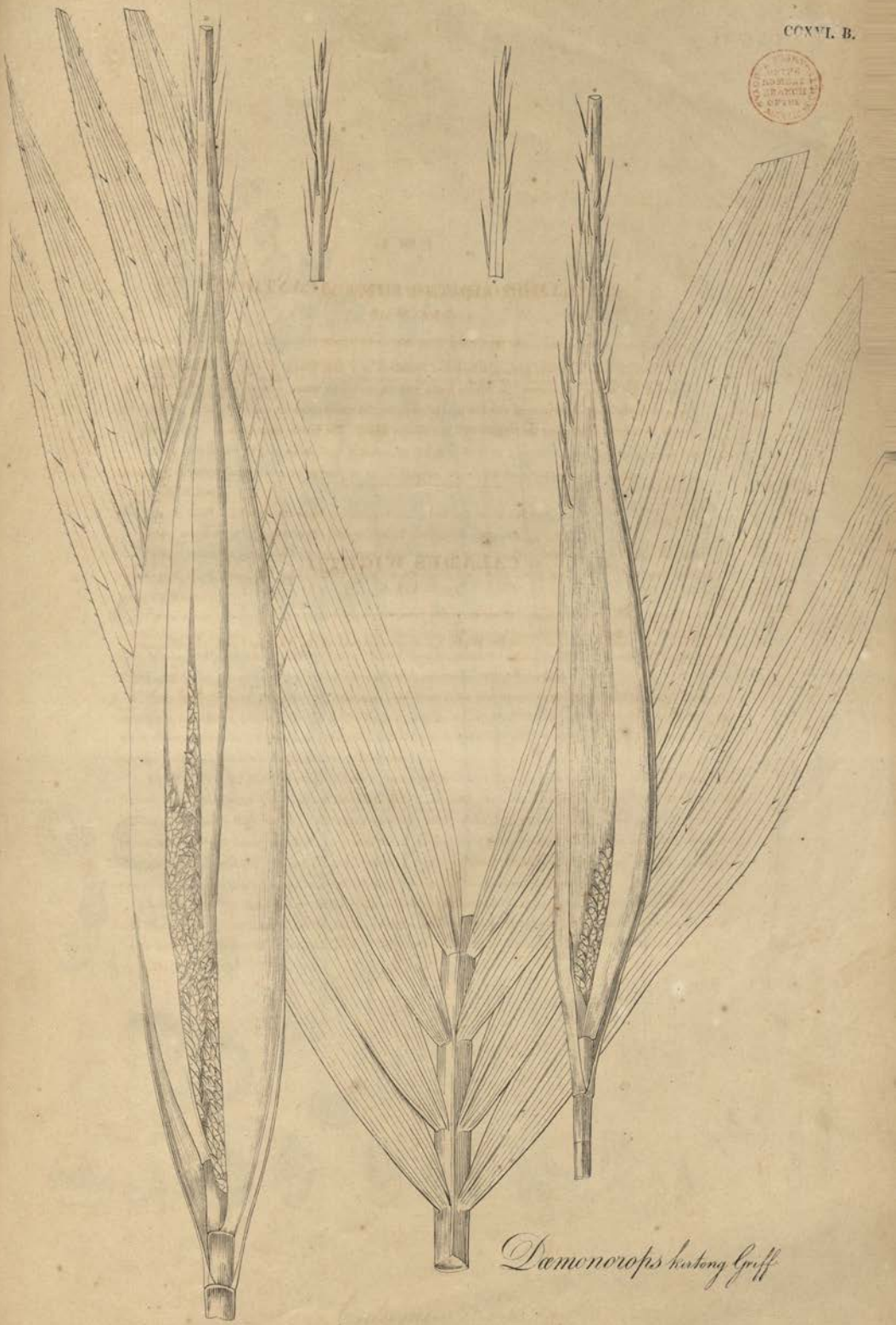
TAB. CCXVI. B.

Under the name of Rotang Kirtong, I have two specimens of a male spadix of what appears an additional species of this section of Calamus. In this the spadix with the spathes are oblong, nineteen or twenty inches long, the outer spathe obscurely bi-carinate with two rows of ascending flat spines about the carinæ, tapering into a long straight stout beak, armed along the margins with very slender spines. The flowers resemble thoss of *C. petiolaris*.

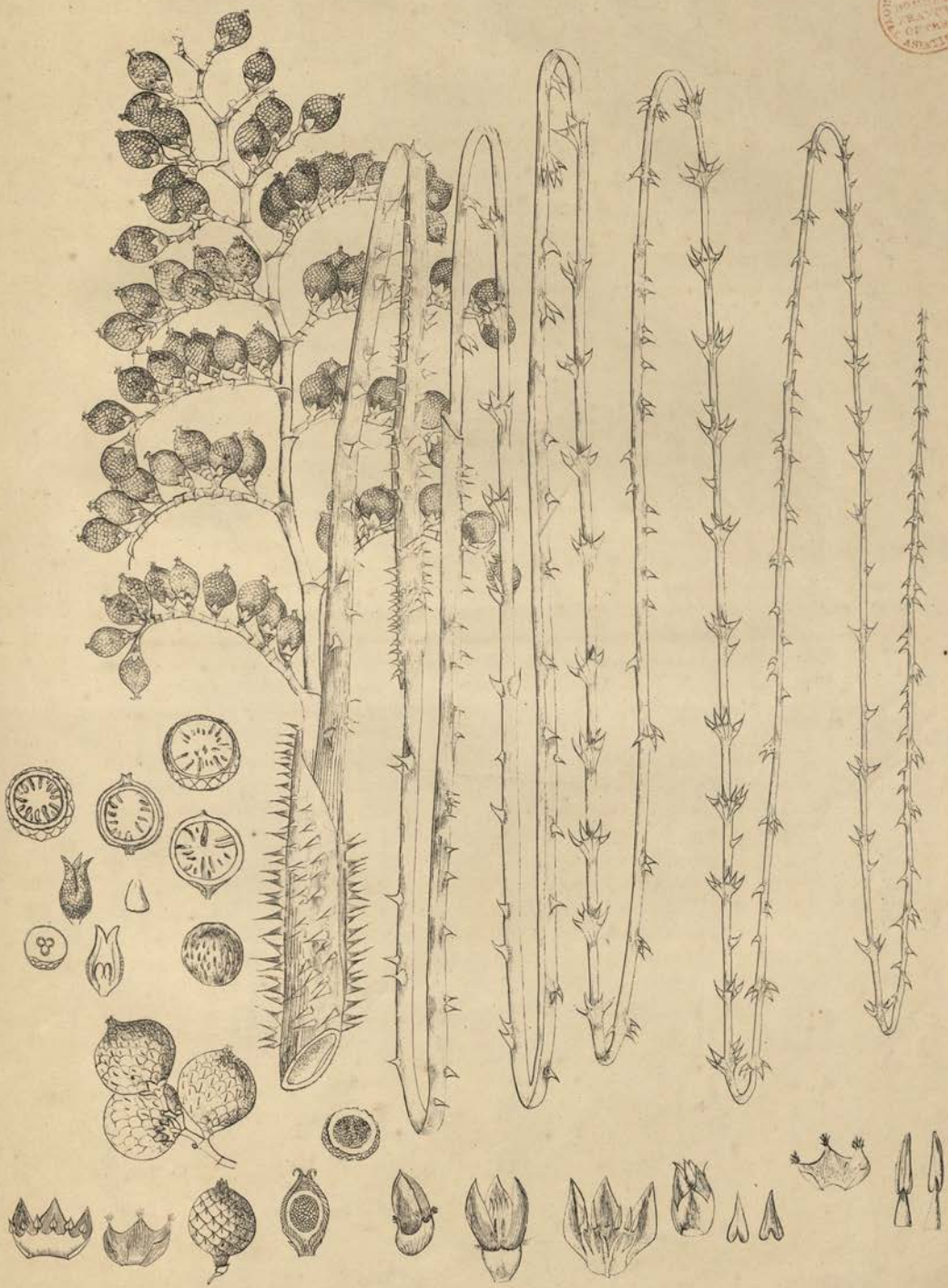
42. CALAMUS WIGHTII.

TAB. CCXVI. C.

This species which was received from Dr. Wight, is distinguished from all the foregoing by the secund arrangement of the fruit.

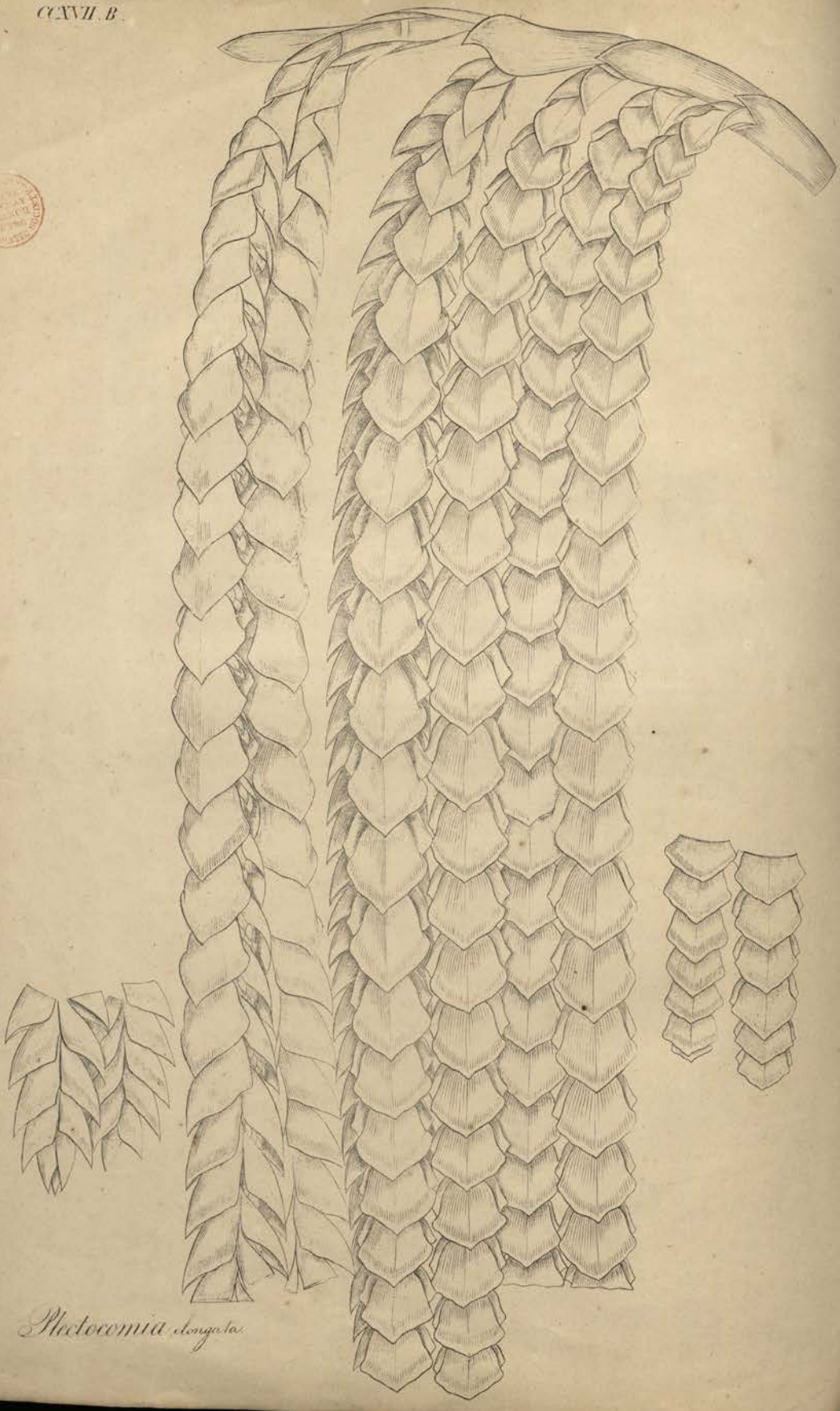


Dæmonorops kistong Griff

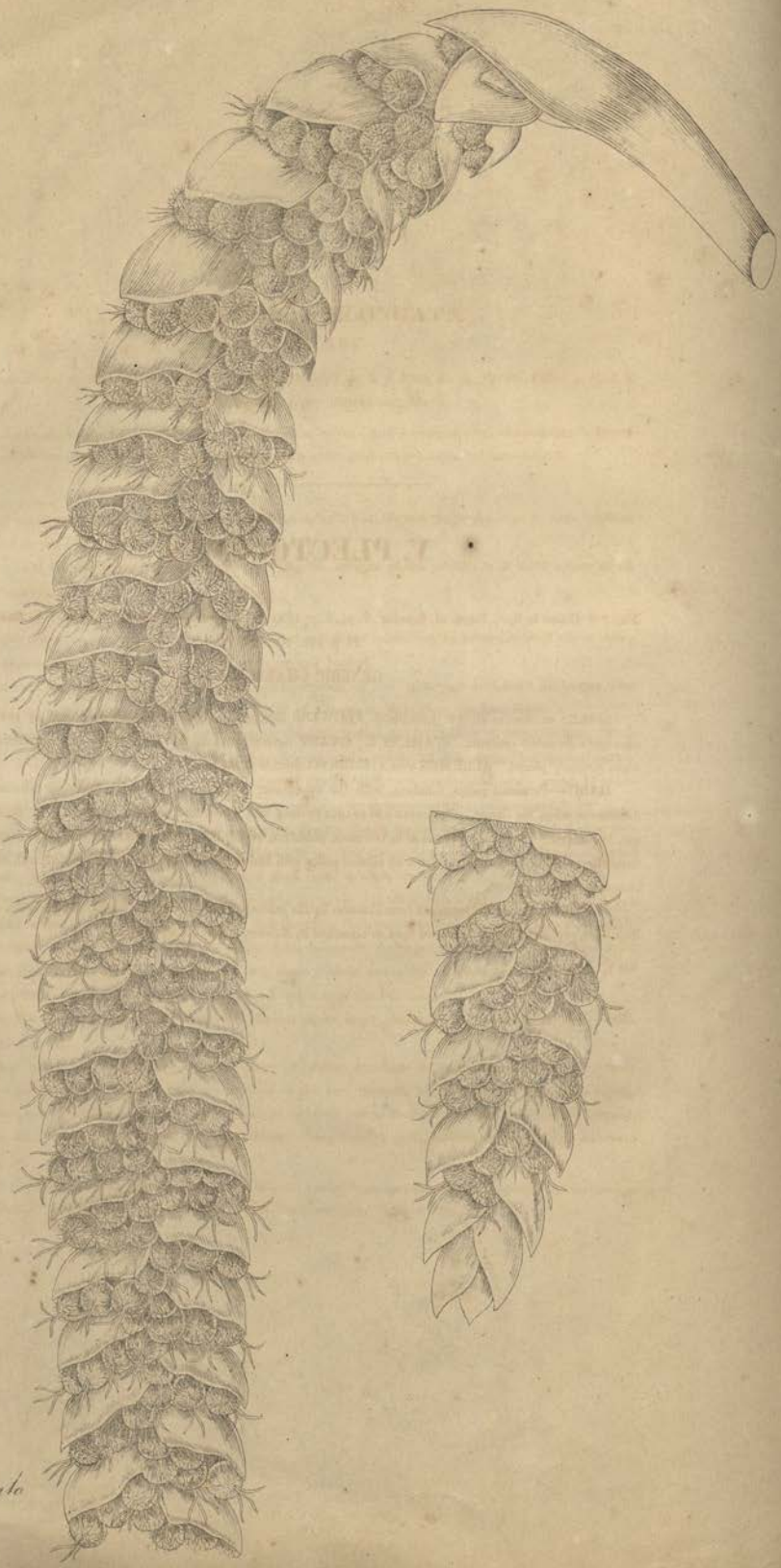


Calamus Wightii Griff.

CCXVII. B.



Plectocomia elongata.



Plectocomia elongata

V. PLECTOCOMIA.

Mart. et Blume in Syst. Veget. ed. Schultes. 7. pt. 2. p. 1333. Mart. Palmæ. p. 199. t. 114. 116. f. 1. Endl. Gen. Pl. p. 249. No. 1738.

GENERIC CHARACTER.

SPIKES or racemes filiform (paniculate). FLOWERS dicœcious, MASCULINE flowers supported by two bracts sometimes obsoletely setiform. STAMENS 6. OVARY covered with scales. FRUIT dry, one to three-seeded, scales reversely placed. ALBUMEN even. EMBRYO situated at the base.

HABIT.—Perennial palms, climbing, with the appearance of Calami or Rotangs. PETIOLES extended into flagellate or whip-like thongs. PEDUNCLE and SPADIX covered with imbricated spathes, branches long, pendulous, and tail shaped. SPATHES distichous or in two rows, persistent, closely imbricated. SPIKES concealed in fissures between the spathes. OVARIUM covered with ciliated scales with fimbricated apices. STYLE three-parted, with subulate branches. FRUIT globose.

OBS.—The genus is distinguished from Calamus by the inflorescence, the setaceous bracts, and the scales of the fruit being prolonged into a fimbriated apex as remarked in *Zalacca*, and in the albumen being even.

1. PLECTOCOMIA ELONGATA.

TABS. CCXVII. A.B.C.

P. elongata, *Mart. et Blume in Römer et Schultes Syst. Veget. 7. pt. 2. p.* 1333, *obs.* 2. *Martius. Palm. p.* 19 *t.* 9. 114. 116. Calamus maximus. *Reinw. auct. Martii.*

Pinnis lineari-lanceolatis (long. 2-3 pedalibus lat. 2-3 uncialibus), spathis (ramorum florig:) ambitu rotundatis, calycis cupuliformis dentibus brevibus mucronatis villoso-ciliatis, petalis oblongo-lanceolatis acutis, squamis (fructus) margine fimbriato-denticulatis.

This is a gigantic climbing species, very striking when in fruit, from the massive pendulous rich brown spadices.

Stem in the lower part almost as thick as the leg.

Sheaths of the leaves much armed, (especially along the margins of the mouth), with stout spines of the usual character.

Leaves with the *flagelli* about twenty feet long.

Petiole armed on the under face with fascicled subulate deflexed spines, varying in number from two to four; in the flagellus these become more numerous, stronger and hooked.

Pinnules distant, arched downwards, linear-lanceolate, tapering to both ends, very acuminate, the longest three feet in length; in breadth two or three inches, coriaceous, of pale-green colour above, glaucous below.

Spadix axillary. *Peduncle* covered with imbricate sheathing spathes, the limbs short, slightly spreading. From the axilla of each of these, a pendulous tail-like branch rises, and is imbricated with similar but smaller spathes, two and a half feet long. The branches are all secund. *Spathes* distichous, amplexicaul, nearly round, $1\frac{3}{4}$ inches broad, acute, coriaceous, brown, very concave: from the middle to the apex the outline is more angular.*

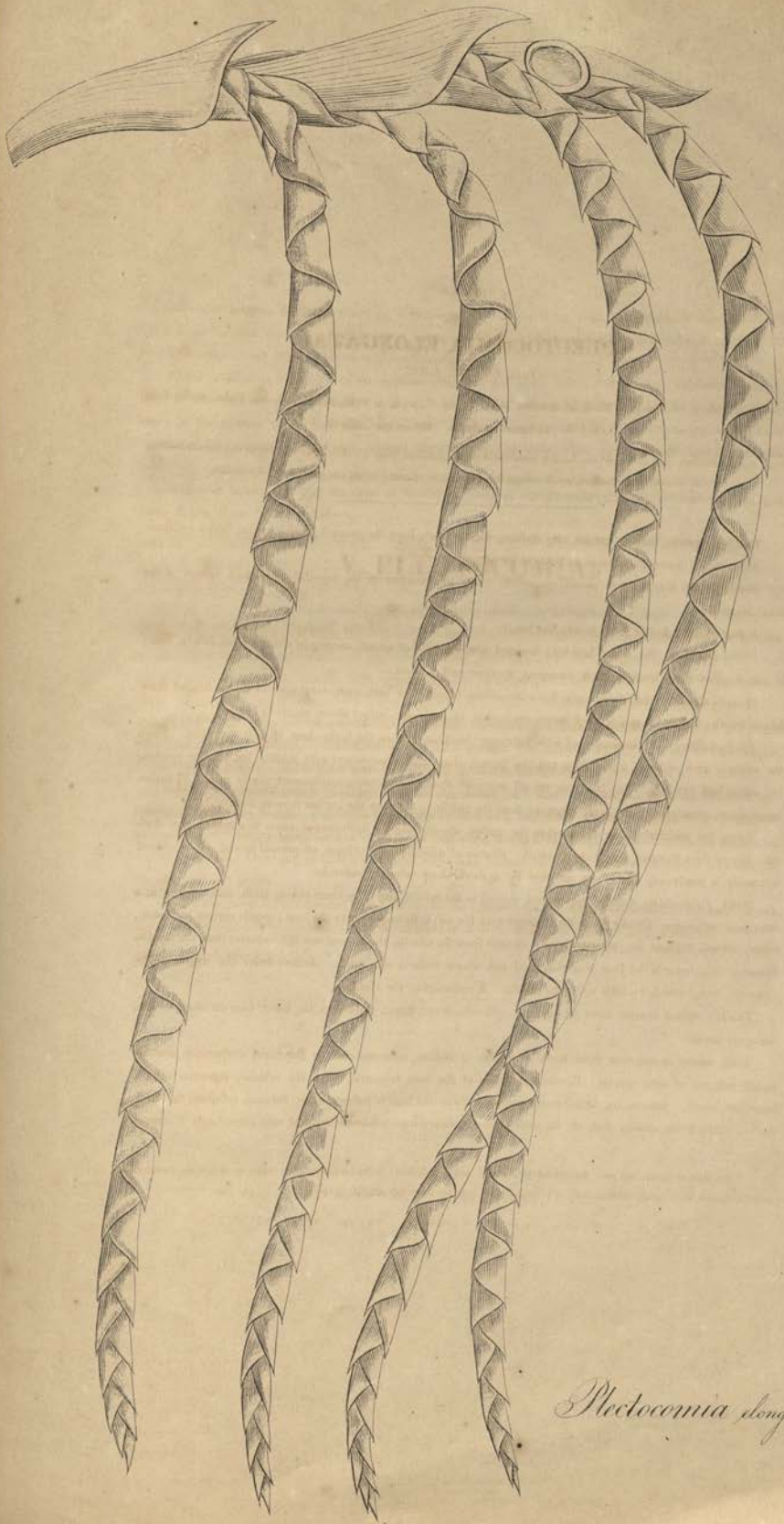
Spikes (or panicles) rather shorter than the spathes, slender, slightly furfuraceous, many flowered. Lower divisions two or three flowered, upper one-flowered. *Flowers* of middling size, oblique, all pressed to one side if viewed anticously, if posticously distichous, suffulted by a short stout subulate bracteole.

MALE. *Calyx* striate, angular, cup-shaped, divided to the middle into three short oblong teeth, each ending in a stout point or mucro. *Corolla* three times longer than the calyx, three-partite to the base; petals narrow-lanceolate, rather, obtuse. *Stamens* six, almost entirely distinct from the corolla, the longest one third shorter than the corolla. *Filaments* long, towards the base triangular and red, above filiform and white. *Anthers* twice the length of the filaments, linear, attached a little below the middle. A rudiment of the *Pistillum*.

FEMALE *Spikes* stouter, more ferruginous. *Flowers* fewer, larger, distichous, the lower ones on short stalks, the upper sessile.

Calyx nearly round, with three teeth triangular in outline, mucronate as in the male, coriaceous, scarcely striate, margins of teeth villous. *Corolla* ventricose at the base, tripartite below the middle; segments oblong-lanceolate, acute. *Stamens* six, united to the corolla as far as the base of its segments; *filaments* subulate, flattened; *anthers* effete, much smaller than in the male flowers. *Ovary* roundish-ovate, covered with exceedingly numerous

* Dr. Martius' figures represent the spathes of the male and female alike; in the female specimens before me though the flowers are open, the spathes are so closely imbricated and so concave that the branches are strictly subulate in form.



Plectocomia elongata (fem.)

reflexed scales ciliately fimbriate, with long multifid points. *Ovules* three, erect, anatropous, so close as to leave some doubt whether septa exist. *Style* short, stout, divided nearly to the base, branches rather longer than the corolla, subulate, inner faces stigmatose and canaliculate.

Fruits crowded in the axillæ of the spathes, which are now more spread out and more indurated, generally three or five together, globular, about the size of a small bullet, surrounded at the base by the perianth; terminated by the remains of the very short style; very hispid, or ramentaceous (each scale terminating in a fimbriate ramentum); incompletely three-celled. *Seeds* (immature) one or three, when three, convex-trigonal. *Albumen* solid.

Hab.—In forests near the sea-shore at Koondoor, Malacca, and generally perhaps in the interior. Malayan name *Rotang Oonar*,* *Rotang Dahown*.

Obs.—This species is of inferior value to most others, and is chiefly used for baskets and other wicker-work.

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* *Oonar*, Mr. Westerhout informs me, is the Malay appellation for the flagelli of these Palms.

2. PLECTOCOMIA KHASIYANA.

TAB. CCXVIII.

Pinnis——spathis obovatis apicem versus obcuneatis, sepalis (fl. fœm.) sub-distinctis planis glabris, petalis e basi lanceolata acuminatis, fructibus rostrato-cuspidatis, squamarum fimbriatarum apicibus deciduis.

The description of this species is derived from specimens of a female spadix in flower, and part of a spadix in fruit.

Spathes of the peduncle with erect oblong-lanceolate limbs. Flower-bearing branches one or two feet long, secund, pendulous. *Spathes* at the base half amplectent, rather distant, distichous, and laxly imbricated; outline obovate, towards the apex broadly obcuneate, margins below this part incurved, (so that they are very concave) two or three times longer than the spaces between them. *Spikes* concealed by the spathes, are two or three times shorter than the latter, and as usual furfuraceous, three or seven flowered.

Flowers distichous, large. *Calyx* flat, small, divided almost to the base into three triangular mucronate smooth teeth. *Corolla* divided almost to the base into three ascending, lanceolate, acuminate segments, four, to four and a half lines long. *Stamens* six, with very broad, flattened, short filaments, and small effete anthers. *Ovarium* broadly globose, covered with exceedingly numerous, shortish, very fimbriate scales with multifid points, three celled. *Style* very short, stout, with three stout, subulate, spreading branches as long as the petals, channelled and stigmatic on their inner faces.

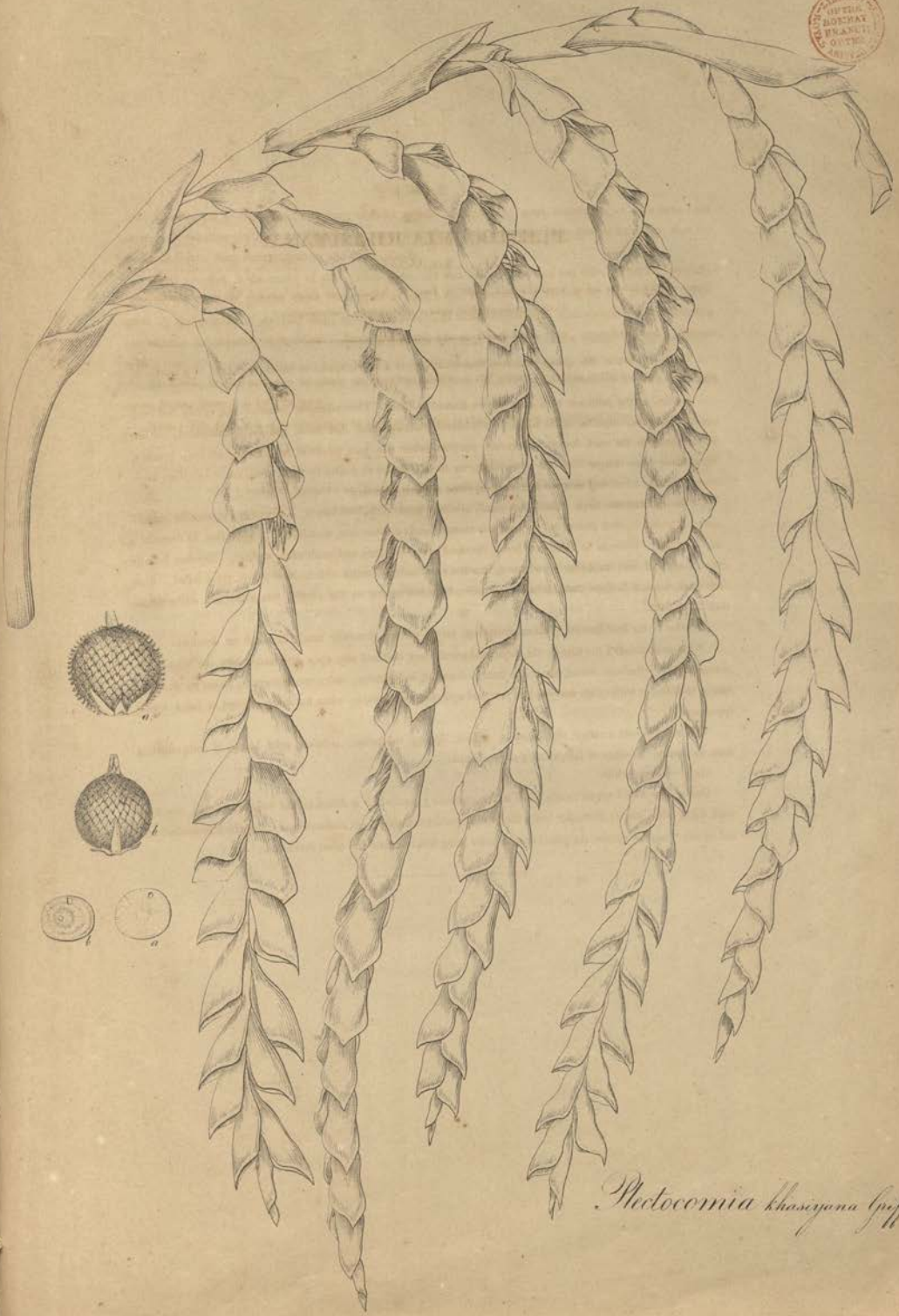
Spathes of the fruit-bearing spadices spreading, rarely perfect, generally much lacerated or deficient.

Fruit surrounded at the base by the calyx, and corolla now flattened out, apex attenuated into the style; rostrato-apiculate, otherwise round, about one inch in diameter, dark brown; scales very numerous, rather small, either nearly smooth, or with ciliate margins and recurved split fimbriate points; when not much rubbed it has a woolly appearance.

Seed covered with a rather thick, brown, cellular spongy substance. *Albumen* solid, horny, of cells radiating from the centre. *Embryo* of the ordinary shape, basilar.

HAB.—Khasiya Hills.

OBS.—This would appear nearly allied to the succeeding from which it differs in the smaller spathes, the very small calxy with minute triangular teeth, the broader petals, the brown, not rust-coloured fruit, which is smaller, and not by any means so villous, the points of the scales being less fimbriate and often deciduous.



Plectocomia khasyana Griff.

3. PLECTOCOMIA ASSAMICA.

Pinnis —— spathis —— calyce (fl. fœm.) ad medium triparito laciniis cuneato-rotundatis, petalis e basi lineari, acuminatissimis fructibus globosis, squamarum apicibus longis persistentibus fimbriatissimis.

The materials from which this brief description is drawn up consist of specimens of a spadix in fruit received in 1840 from Upper Assam, and which I find marked in the Botanic Garden "Zalacca." The *spadix* is large, the branches very ferruginous, two, or three and half feet long. *Spathes* two and half, to three inches long, shape not ascertained from their being much lacerated and split, and partly deficient.

Fruit (when dry), of a rich ferruginous brown colour, eleven or twelve lines in diameter, surrounded at the base by a calyx of three ovate-oblong sepals, and a corolla consisting of as many petals, which are very long and acuminate from a linear base, terminated by a style tripartite almost to the base with subulate connivent branches; one-celled, very villous from the highly ciliate, fimbriate, split, recurved points of the scales. *Seed* similar to that of the succeeding, but a little larger. *Albumen* cartilaginous, solid, its tissue radiating from the centre. *Embryo* basilar. (Figs. *a a.* Tab. CCXVIII).

Hab.—Upper Assam.

Obs.—I have under the preceding species, noted the differences by which this appears to be distinguishable. The fruit is a good deal like that of *P. elongata*, judging from Martius' figure, (palmæ. loc. cit.) but the scales are so fimbriate, that it has quite a woolly appearance.

4. PLECTOCOMIA HIMALAYANA.

TAB. CCXIX.

Pinnis lineari-lanceolatis (long. 1 ½ pedalibus lat. 1 ¾ uncialibus) 5 veniis, spathis cuneato-oblongis apicem versus late obcuneatis, floribus masculis setis tribus suffultis, calycis ultra medium tripartiti cupuliformis laciniis glabris in setam desinentibus.

This species is described from specimens consisting of a portion of a leaf and male spadix.

The pinniferous part of the *petiole* is armed below with stout hooked prickles, confluent at the base, these are continued in increased number into the flagellus.

Pinnules alternate, linear-lanceolate, very acuminate, eighteen inches long, one and three quarters broad, with five prominent veins on the upper surface, margins with short sub-appressed spinescent teeth; from the great degree of conduplication of the base, the pinnules may almost be said to be petioled.

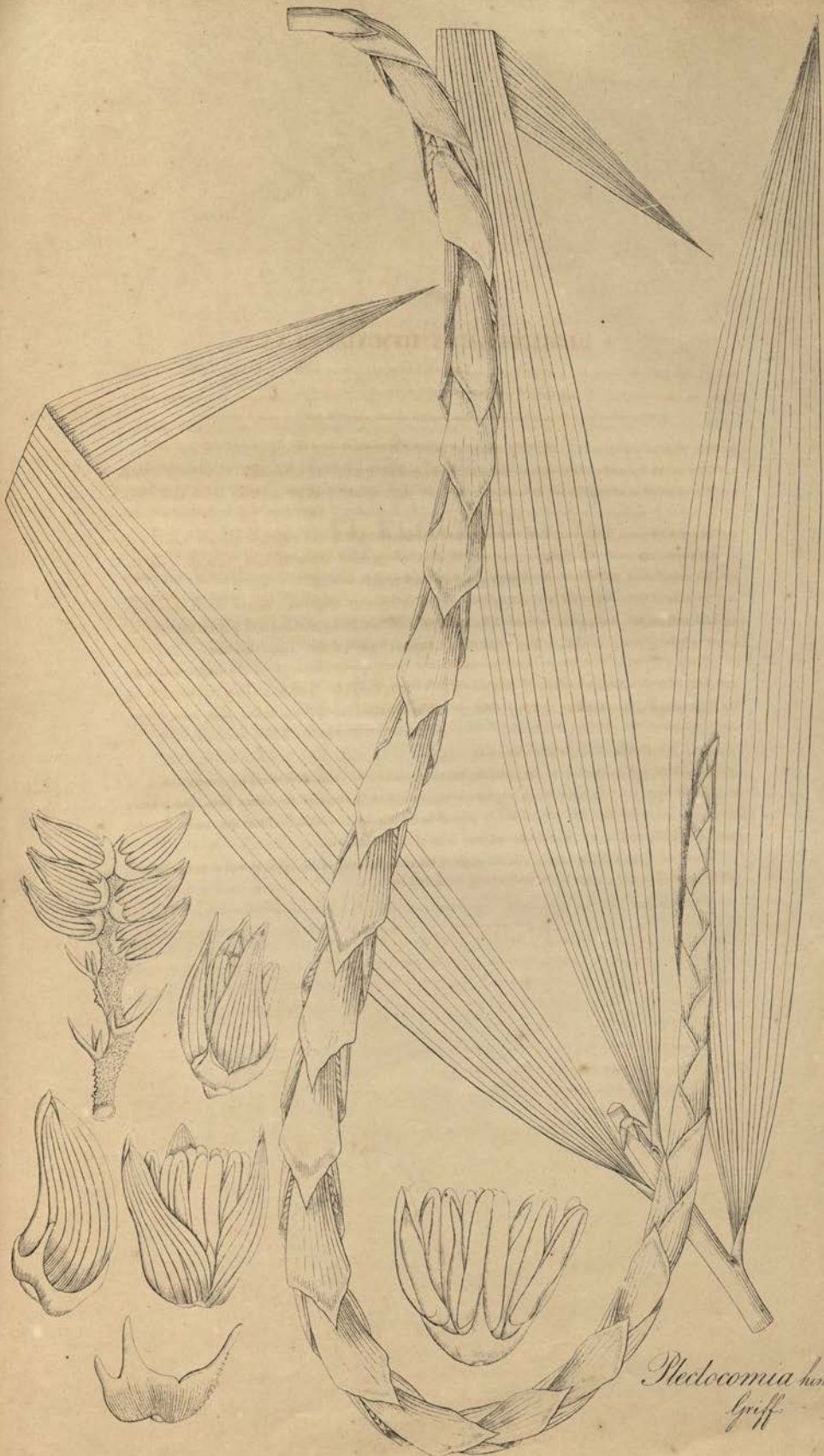
Branches of the *spadix* about two feet long, covered with rust-coloured tomentum. *Spathes* almost stem-clasping, conduplicate, coriaceo-scarious, apex decidedly obcuneate in outline; they exceed in length by ¼ the inter-spathal spaces. *Spikes* solitary, about half as long as the spathes, angular, flexuose, densely rusty-tomentose.

Flowers suffulted by three narrow bristle-pointed scarious bracts, sub-distichous. *Calyx* cup-shaped with three short rounded teeth ending in bristles. *Corolla* oblong and oblique, four or five times longer than the calyx: petals hard. *Stamens* six, united at the base into a short cup; *filaments* stoutish, subulate; *anthers* large, linear-oblong, obtusely sagittate. No rudiment of a female?

HAB.—Sub-Himalayan ranges about Dargeling.

OBS.—This may be the male of the preceding, but the appearance of the spathes, which are generally much the same in both sexes, and their shape, which is cuneate-oblong with straight edges in the oblong parts, and concave edges in the obcuneate part, has induced me to attempt to characterise it as distinct. I may also remark that the plants of the Khasya Hills are generally distinct from those of the Himalayas.

From *P. elongata* it differs essentially in the shape of the spathes, in that of the calyx, as well as in the smoothness of its margins, and perhaps in the flowers being tribracteolate.



Plectocomia himalayana
Griff

VI. EUGEISSONA.

GENERIC CHARACTER.

INFLORESCENCE terminal, paniculate. FLOWERS dicœcious terminal and solitary. STAMENS indefinite. OVARY covered with scales. FRUIT dry, 1-seeded. ALBUMEN cartilaginous or horny, with six furrows. EMBRYO basilar.

HABIT.—Almost stemless spreading palms.

LEAVES pinnate, the sheath and the petiole below the pinnules, both armed with flat awl-shaped spines.

PINNULES linear, central vein on each surface setigerous.

PANICLES four to six feet, erect, aspect sad, of brownish colour, every where covered with imbricated spathes.

SPATHES, the primary ones armed on the back, and prolonged into a beak-like attenuated apex; the secondary ones pointed, and towards the dorsal keel slightly spinose, the tertiary ones unarmed.

FLOWERS large, half immersed in closely imbricated bracts.

CALYX trifid (membranously chartaceous) *Corolla* three petalled, petals rather long and spinosely cuspidate, those of female flowers have a pennicillate tuft of abortive stamens, which, uniting form a keel.

ANTHERS linear adnate.

STYLES three stigmatose internally. OVULE solitary anatropous. FRUIT ovate rostrately mammillate, the size of a hen's egg, brown. ENDOCARP bony. SEED erect, dry.

EUGEISSONA TRISTE.

TABS. CCXX.· A.B.C.

This is a stemless palm, growing in thick tufts, which are surrounded by the debris of the old leaves. *Leaves* numerous, the outer ones spreading, fifteen to twenty feet in length.

Petiole throughout the lower seven or ten feet, roundish, armed with brown, ascending, flat spines, between the pinnules unarmed, triangular. *Lamina* in outline oblong-linear. *Pinnules* two, or two and a half feet long, narrow, scarcely an inch wide, subulately acuminate, margins when dry much involuted, the central vein prominent above, and furnished with distant setæ; the old ones generally irregularly split at the point.

Inflorescence terminal, paniculate. *Panicles* four or six feet long, in the lower part furnished with a few small leaves, the sheaths of which are much armed, gradually passing into the *spathes*, which are similarly armed and very acuminate, indeed often flagelliferous.

Branches of the panicle flexuose, much imbricated with coriaceous amplexicaul brown bracts or spathes, the lower of which slightly armed along the dorsal carina, the uppermost unarmed. The lower branches two or three-flowered, the upper one-flowered.

Flowers dicecious, terminal, subsessile, very large, surrounded at the base by similar, but smaller, highly imbricate bracts.

MALE. *Calyx* sub-cylindrical, altogether concealed by the bracts, membrano-chartaceous, trifid, teeth narrow, acute, with broad sinuses, venation the same as that of the innermost bracts. *Corolla* 3-petalled, exceedingly long, (about one and a half inch in length). *Petals* oblong-linear, somewhat constricted opposite the throat of the calyx, indurated, striated, obliquely ascending, point oblique ending in a very sharp thorny acumen. *Stamens* indefinite; *filaments* short; *anthers* long, linear, adnate, of a lilac colour. No rudiment of a female observed.

FEMALE *flowers* rather longer than the male, otherwise similar. The petals opposite the mouths or opening of the calyx, bear a tuft or pencil of abortive stamens which run down in the shape of a keel.

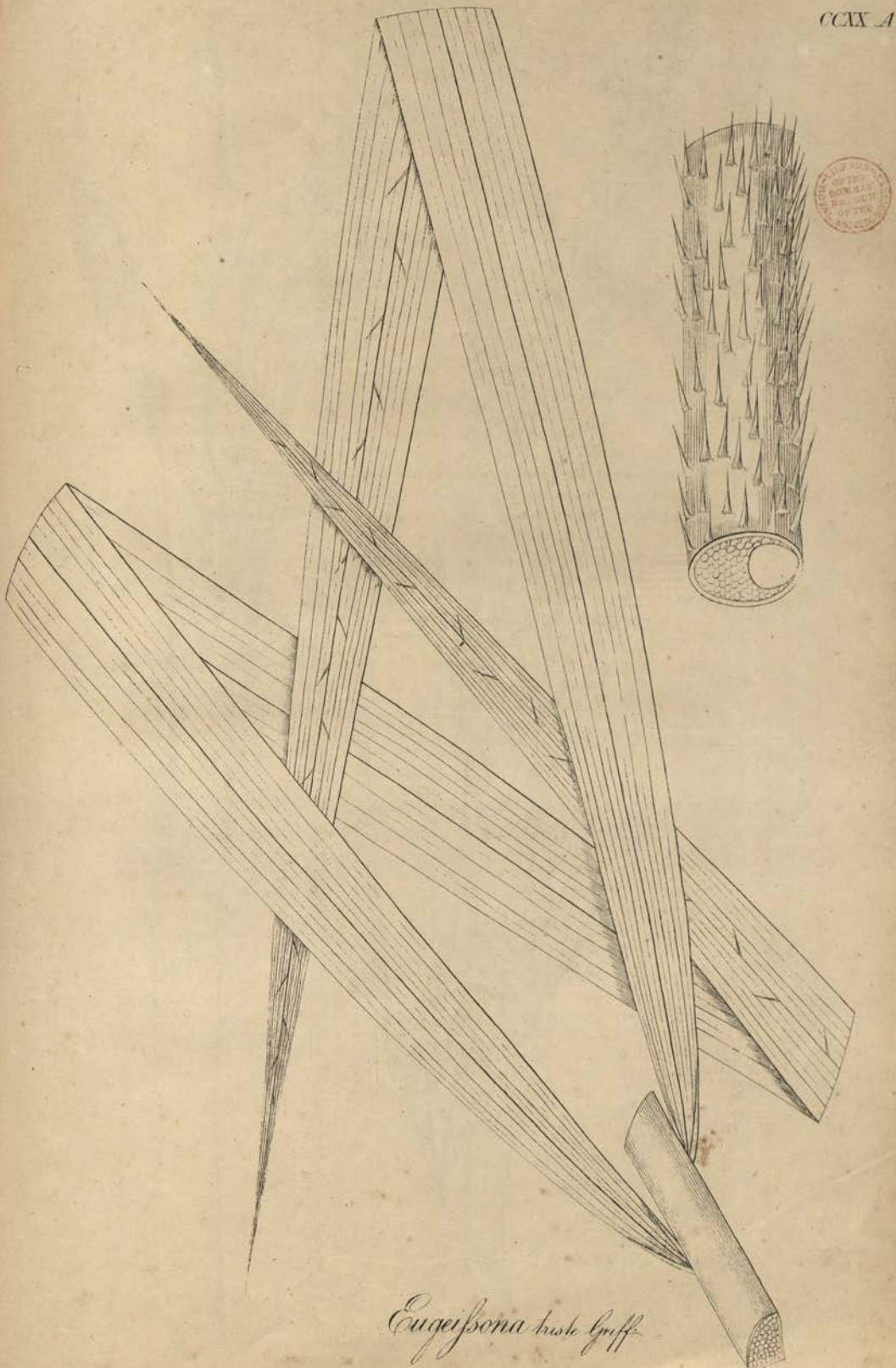
Ovary oblong, densely covered with scales, of about the same length as the calyx, sub-trigonal at the apex three-celled. *Ovule* solitary, oblong, erect, anatropous. *Styles* three, oblong, flattish, sub-connivent and stigmatose on their inner faces.

Fruit densely scaly, generally rough from the recurved points of the scales, dark brown, ovate with a stout rostrum or point, terminated by the remains of the styles, surrounded at the base by the now divergent petals often thrown to one side, one-celled, one-seeded. Substance very thick at the base, consisting of rust-coloured spongy tissues interspersed with fibres; above thin, consisting of fibres alone. *Scales* rough to the touch, lanceolate, with irregular margins; dark brown with paler edges.

Seed large, covered with a brown membrano-cellular covering, surface with six furrows, of which the alternate ones are the largest and most complete, running into each other at both ends. These furrows are filled with the tissue surrounding the seed. *Albumen* equal, horny, cartilaginous, presenting on a transverse section the furrow, above mentioned. *Embryo* basilar.

HAB.—In forests on the hills about Ching, Malacca, very common. It is also common in Penang where

Eugeissona tristis Griff.



Eugeissona tristis Griff.

Eugeissona tristis Griff.

Eugeissona tristis Griff.

according to Mr. Lewis it is much used in making mats for sides of houses, for thatch, and the same purposes as those of *Nipa fruticans*. Malayan name, *Bertam*.

Obs.—It appears to constitute a distinct genus by its inflorescence, (which is scarcely clearly explainable by the use of the terms ordinarily used in descriptions of palms), by its indefinite stamens and the structure of the seed. No other Indian genus of this sub-family, so far as I know, has more than six stamens: and the only approach to the present genus in this respect takes place in *Ruffia*, which genus also has linear oblong cuspidate petals.

VII. CORYPHA.

Linn. (Mus. Cliff. 11*). Gen. Pl. ed. 6ta. p.* 572. *No.* 1221. *ed. Schrebre. p.* 774. *No.* 1690. *Syst. Pl. ed. Schult.* 7. *p.* lxxviii. *No.* 1493. *Juss. Gen. p.* 39. (partim). *Gærtn. Fruct. et. Sem.* 1. *p.* 18. *t.* 7. (semine inverso). *Lam. Enc. Meth. t.* 899. (e Rheede et Gærtner). *R. Br. Pr. Fl. Nov. Holl. ed.* 2*da. p.* 123. *Roxb. Fl. Ind.* 2. *p.* 174. *Icones.* 7. *t.* 37. *Suppt.* 3. *t.* 80. *Mart. Progr. p.* 10. (partim). *Palmæ.* 231. *Endl. Gen. p.* 252. *No.* 1753. Codda-Pana. *Rheed. Hort. Mal.* 3. *p.* 1. *t.* 1-12. Talliera. *Mart. Progr. p.* 10. *Syst. Pl. ed. Schult.* 7. *p.* lxxviii. *No.* 1492. Gembanga. *Blume. in Bot. Zeit.* (1825). 2. *p.* 580. *et* 678. (e Martio).

GENERIC CHARACTER.

FLOWERS hermaphrodite. CALYX three-toothed. COROLLA three-petalled. STAMENS 6, hypogynous. FILAMENTS distinct at the base. OVARIES three, cohering. STYLES connate. FRUIT (generally one only matured) a berry, one-seeded. ALBUMEN horny, hollow in the centre. EMBRYO placed near the apex of the albumen.

HABIT.—Lofty arboreous Asiatic Palms, flowering but once. Trunk ringed or spirally channelled. Crown large and broad. Petioles without any reticulated fibres at their bases, the margins armed with prickles. Leaves palmate much divided, each division bilobed at the apex. Inflorescence terminal and very large. Spathes both primary and secondary numerous. Flowers glomerated, short-pedicelled, yellow. Fruit olivaceous yellow.

Obs.—In their affinities they approach near to *Livistona*, from which they are distinguished by their flowering only once, by their terminal inflorescence and secondary spathes.

CORYPHA ELATA.

TAB. CCXX. D.

C. elata, Roxb. Fl. Ind. 2, *p.* 176. *Icones Suppt.* 3. *t.* 80. *Mart. Palm. p.* 233.

Trunco spiraliter sulcato, petioles spiraliter dispositis exauriculatis, lamina (petiole breviore) plana, lacinüs 85-90 profundis lineari-ensiformibus obtuse bilobis posticis cum petiolo angulum acutum efformantibus, glomerulis florum distantibus, petalis lanceolatis, fructibus sclopet globuli magnitudine, embryone versus apicem albuminis solidi.

"*Trunk* straight, but often varying in thickness. I have two trees, which were pretty well ascertained to be about thirty years old when in flower; one was seventy feet to the base of the inflorescence, the other about sixty; circumference near the root eight feet, and about the middle of the trees five and a half or six: their whole length strongly marked with rough, dark coloured, spiral ridges, and furrows, which plainly point out the spiral arrangement of the leaves. The ligneous fibres as in the order are on the outside, forming a tube for the soft spongy substance within, of dark chocolate colour, tough and hard, but by no means equal, in either quantity or quality, to the very serviceable wood of *Borassus flabelliformis*.

Leaves round the top of the trunk, immediately under the base of the inflorescence, numerous, palmate pinnatifid, plaited, from eight to ten feet each way; *segments* generally from forty to fifty pair, united about half their length, ensiform, apices rather obtuse and bifid, texture hard, smooth on both sides. When the tree begins to blossom, the leaves wither and fall off, leaving the fructiferous part naked.

Petioles from six to twelve feet long, concave above, with the thin, hard, black margins thereof cut into numerous, very short, curved spines.

Spathes numerous, there being one at each joint of the various ramifications of the spadix, all smooth and when recent, of a pale yellowish green.

Inflorescence, (spadix) terminal; it may be called an immense, more than supra-decompound round panicle; in this species it is of a much smaller span than the leaves, and only about one-fourth, or one-fifth, part of the whole height of the tree; the various and innumerable ramifications are always alternate, smooth, and of a pale yellow colour.

Flowers small, sessile, collected in little bundles over the ultimate divisions of the panicle, pale yellow, small rather offensive. *Calyx* small, three toothed. *Petals* three, oblong, reflexed, shorter than the stamens. *Filaments*, six, broad at the base, and there united, toward the apex slender and incurved. *Anthers* ovate.

Germ superior, round-ovate, three-lobed, three-celled with one *ovulum* in each, attached to the bottom of its cell. *Style* short, three-grooved. *Stigma* three-lobed. *Berry* globular, the size of a musket ball, olive-coloured, smooth when fresh, but it soon becomes dry and wrinkled, one-celled; the two abortive lobes of the germ are always to be found at the base.

Seed solitary, subglobular. *Integuments* apparently two, but they are firmly united, and of a friable texture; the *exterior* one, pale yellowish brown, and veined; the *interior* one brown, and adhering firmly to the perisperm.

Perisperm conforms to the seed, is of a hard, horny texture, and a pale gray colour. *Embryo* simple, short, cylindric lodged near the apex of the perisperm." *(Roxb. o. c. l. c.)*

Corypha elata.

To this I have to add that the petioles are much more slender than in the other species, their sides marked with oblique furrows, corresponding with the teeth, which are very large. They separate a little above the base: this afterwards becomes longitudinally split, and long afterwards falls off. The *lamina* describes nearly a complete circle; length five or six feet, breadth fifteen feet; the posterior pinnules do not meet, much less overlap. *Laciniæ* or divisions, about eighty-five in number, linear-ensiform, much narrower than in the others: the central ones are about three feet long, the lateral and intermediate about 3 ½ feet; the posticous ones towards the base present denticulate margins.

Hab.—Bengal flowering in March and April: the seeds require about twelve months to ripen. *Bujoor* or *Bujur-batool*, is the Bengal name. Cultivated in the Botanic and some other Gardens about Calcutta. I have not seen it in flower or fruit.

Obs.—This Palm will be at once recognised by its black spirally marked trunk. From the other species of *Corypha* it is abundantly distinct by its long, obviously spirally placed ex auriculate petioles, and by the smaller-dark green flat lamina, with narrow linear-ensiform segments. The fruit is also smaller.

According to Roxburgh's drawing here annexed, the inflorescence of this species is so dense that no part of the spadix or spathes is visible, and the outline is irregularly pyramidal, some of the branches being much larger than others.

2. CORYPHA TALLIERA.

TABS. CCXX. E.F.

C. Talliera, *Roxb. Cor. Pl.* 3. *p.* 58. *t.* 255-256. (auct. Mart.) *Icones* 7. *t.* 37. *Fl. Ind.* 2. *p.* 174. *Mart. Palmæ.* *p.* 231. Talliera benghalensis. *Spreng. Syst.* 2. *p.* 18. Talliera Talli. *Mart. Syst. veg. ed. Schult.* 7. *p.* 1306.

Trunco obsolete annulato, petioles biauriculatis, lamina (petiolum excedente) glaucescente a medio supra conduplicata laciniis 80-90 ensiformibus bilobis posticis incumbentibus, glomerulis florum approximatis, petalis oblongis æstivatione imbricatis, fructibus pomi minoris magnitudine rugosis, embryone in apice albuminis centro cavi.

"*Trunk* perfectly straight, about thirty feet high, and as near as the eye can judge equally thick throughout, of a dark brown colour, and somewhat rough with the marks left by the impression of the fallen leaves.

Leaves palmate-pinnatifid, plaited sub-rotund.

Leaflets or divisions of the frond, united rather more than half way, numerous, generally about eighty, (or forty pairs), linear-lanceolate, pointed until broken by the wind or other causes, polished on both sides, with a strong somewhat four-sided rib, running their whole length; generally about six feet long, greatest breadth about four inches. The thread which forms part of the *Linnæan specific character* of *Corypha umbraculifera*, is sometimes present, sometimes wanting, at best such perishable marks deserve no notice.

Petioles from five to ten feet long, remarkably strong, upper side deeply channelled, the sharp margins armed with numerous, short, strong, dark-coloured polished, compressed spines.

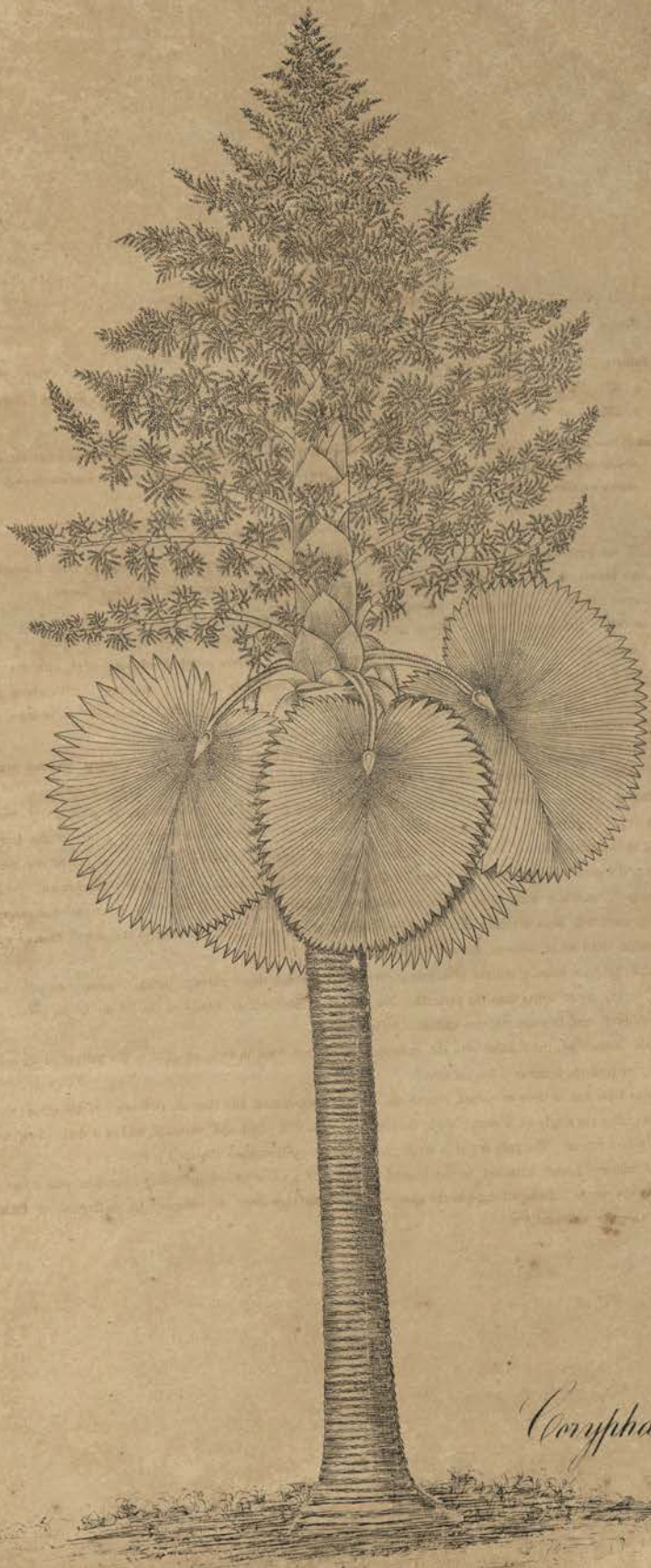
Spathes just as numerous as the primary and secondary ramifications in the spadix, all smooth, and obtuse. *Spadix* supra-decompound, issuing in the month of February from the apex of the tree, and centre of the leaves, forming an immense, diffuse, ovate panicle, of about twenty or more feet in height, so that the height of the whole tree, from the ground to the top of the spadix is now about fifty feet. Primary branches alternate, round, spreading nearly horizontally with their apices ascending. Secondary ramifications alternate, bifarious, compressed, drooping, recurved, soon dividing into numerous, variously curved, smaller, subcylindric branchlets, covered with innumerable, small white, odorous, subsessile flowers.

Calyx; perianth inferior, minute, obscurely three toothed. *Petals* three, oblong, concave, fleshy, smooth, expanding, many times larger than the perianth. No nectary. *Filaments* six, nearly of the length of the petals, at the base broad, and in some measure united. *Anthers* ovate.

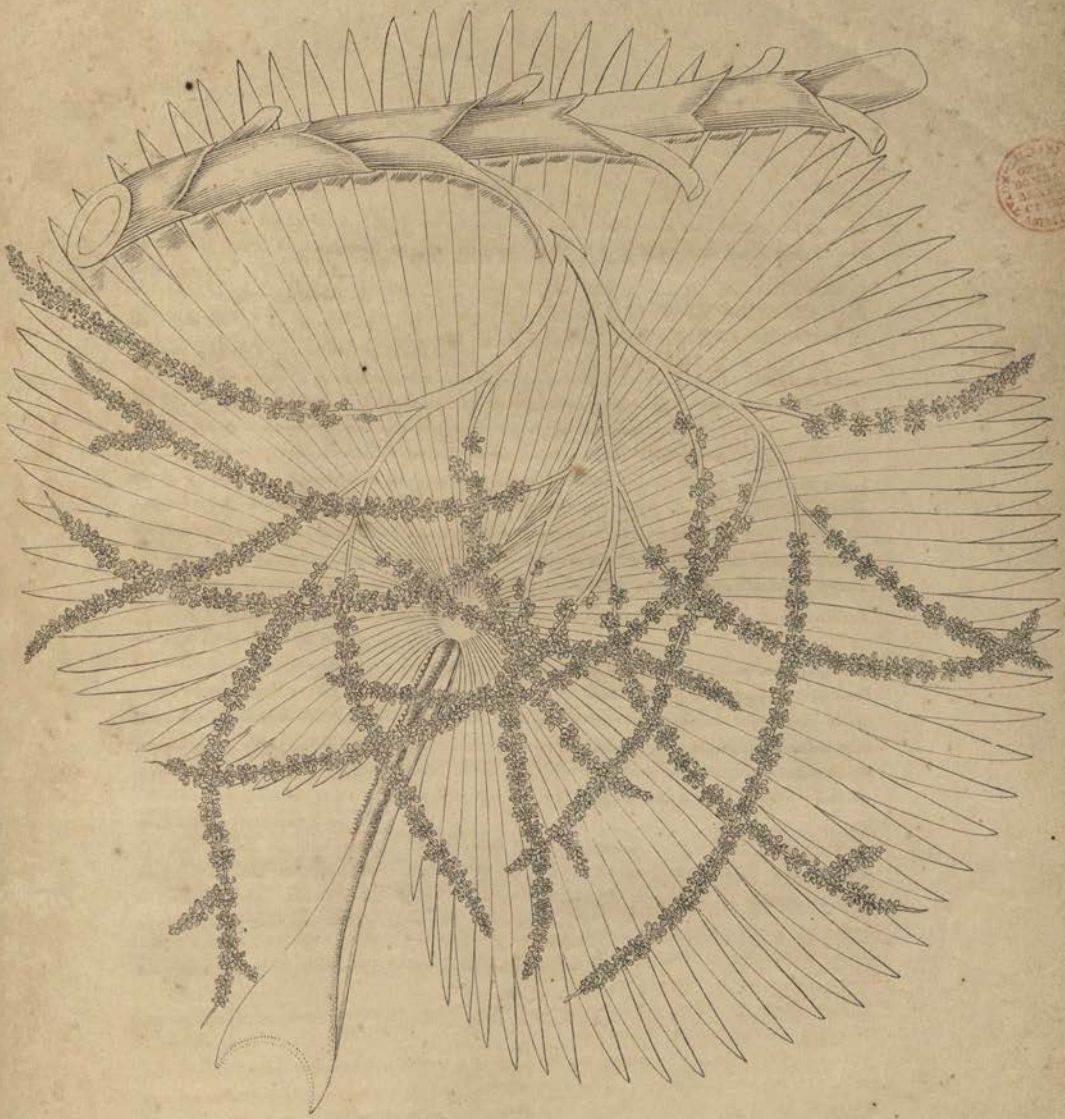
Germ three-lobed, three-celled with the embryo of a distinct seed in each, attached to the bottom of its cell. *Style* shorter than the stamens. *Stigma* simple.

Berries from one to three conjoined, though one is the most common, and then the rudiments of the other two are present, they are singly quite round, about the size of a crab-apple, when ripe, wrinkled, and of a dark olive, or greenish yellow colour. The pulp is but in small proportion, and yellow when the fruit is ripe.

Seed solitary, round, attached to the base of the berry, of a white colour, and horny substance, with a small vacuum in the centre. *Embryo* lodged in the apex, which circumstance alone, is sufficient to distinguish it from *Gætner's Corypha umbraculifera.*



Corypha taliera Roxb.



Corypha taliera

The leaves of this tree are employed by the natives to write on with their pointed steel bodkins, and also to tie the rafters of their houses, for they are said to be strong and durable. I do not find that the wood is applied to any useful purpose." *(Roxb. o. c. l. c.)*

Hab.—Bengal, but it is scarce in the vicinity of Calcutta. It flowers at the beginning of the hot season, the seeds ripen nine or ten months afterwards. It is the *Tara*, *Tallier* or *Tareet*, of Bengal. Cultivated in the Botanic Gardens. I have not seen the flowers or fruit.

Obs.—This species is so closely allied to *C. umbraculifera*, as to be difficult to distinguish when out of flower. The Botanic Garden specimens are distinguishable by the lamina of the leaf being conduplicate from the middle upwards, and by their posticous segments overlapping, so that the whole becomes peltate.

The leaves are very like those of *Borasus flabelliformis*, but much larger. The petioles are bi-auriculate and without an obvious spiral arrangement, they separate at the top of the dilated part, and subsequently fall off, leaving a smooth trunk. The *lamina* is five or six feet long, fifteen feet broad, glaucescent; the segments ninety, or ninety-five in number, deeper and broader than in *C. umbraculifera*, the central ones being 3 to 3½ feet long.

Roxburgh's drawing here annexed, represents the inflorescence as conico-pyramidal, longer than the crown of leaves and open, so that the spathes and branches are seen distinctly, and these last as regularly diminishing upwards.

P. S. I subjoin descriptions of flowers and fruit from Garden specimens with the name C. umbraculifera, but which I suspect to be *C. talliera*.

Flower-bearing branches often dichotomous above the mouths of their spathes, about two inches long. *Flowers* several together, placed on short stout sub-annulate stalks, among the bases of which, small scales may be found. *Calyx* short, cup-shaped, with three very rounded teeth. *Corolla* three times longer than the calyx, petals oblong, concave, very spreading, in bud imbricate! *Stamina* six; *filaments* stout subulate, about as long as the petals, those opposite the petals being twice as broad; *anthers* oblong-ovate. *Ovarium* globose turbinate, three-lobed, each lobe with three depressed areolæ on its vertex. *Style* about as long, stout, subulate, three-furrowed. *Stigma* sub-simple. *Ovula* solitary, erect, anatropous.

Fruit globose, substance excepting the cutis rather thick, homogeneous, fleshy, cellular. *Seed* erect, oblong roundish; tegument externally cellular, coriaceous internally blackish, sub-osseous, adhering firmly to the very dense, hollow in the centre. *Albumen* horny. *Embryo* situated rather obliquely in the apex of the albumen, the cavity containing it communicating with the central cavity of the albumen.

3. CORYPHA UMBRACULIFERA.

C. umbraculifera, *Linn. Spec. Pl. ed. 2da. p.* 1657. *Fl. Zeyl. p.* 187. (excl. syn. Rumphii). *Gærtn. Fruct. et. Sem.* 1. *p.* 18. *t.* 7. sem. inverso. *Willd. Sp. Pl.* 2. *p.* 201. *Spreng. Syst. Veg.* 2. *p.* 138. *Lam. Enc. Meth.* 899. (e Rheede et Gærtner). *Syst. Veg. ed. Schultes.* 7. *p.* 1308. *Roxb. Fl. Ind.* 2. *p.* 177. *Mart. Palm. p.* 232. Codda Pana. *Rheede. Hort. Mal.* 3. *t.* 1-12.

Trunco annulato, petioles exauriculatis, lamina (petiolum subæquante) a medio supra conduplicata, lacinlis 90—100 parum profundis ensiformibus bilobis posticis cum petiole angulum acutum exhibentibus, glomerulis florum approximatis, fructibus pomi minoris magnitudine et forma, embryone in apice albuminis centro cavi.

In appearance, this species is very much like *C. talliera.*

The *leaves* are however larger than those of the species alluded to; and in its native places they attain an immense size.

Petioles stout, seven feet long, channelled, margins with horny, irregular teeth, often placed in pairs.

The *lamina* describes nearly a complete oval, six feet long and thirteen feet broad, from the middle upwards conduplicate, but not so much so as in *C. talliera; leaflets* ninety-five or a hundred in number, ensiform, obtusely bifid, the central ones $1\frac{1}{4}$, the intermediate ones, $1\frac{3}{4}$ feet long, the posticous ones not meeting or overlapping, but forming acute angles with the petiole.

Inflorescence much the same as in *C. talliera.*

The following is a description of specimens of part of the inflorescence, from trees growing around some of the pagodas at Mergui, most probably belonging to this species.

Flower-bearing branches eighteen or twenty inches long, the lower divisions bi-trichotomous, the rest simple; these are about a foot long, subulate, covered with warty protuberances marking the situations of the flowers.

The *flowers* are placed several together on short sub-annular stalks, at the base of which small scales exist. *Calyx* cup-shaped, small, with three very short teeth. *Petals* broader, spreading, three or four times longer than the calyx: sub-valvate in æstivation, upper edges quite so. *Stamens* six; *filaments* rather shorter than the petals, about equal, stout, subulate; *anthers* oblong, ovate in bud, much larger than those of *C. talliera. Ovarium* conical from a round base, three-lobed, attenuated into a stout subulate three-furrowed *style*, which is rather longer than the ovarium. *Stigma* simple. *Ovula* solitary, erect.

Hab.—Ceylon, the Malabar and Malay Coasts. *Tala* or *Talagas*, Cinghalese. *Condapari.* Tamul. *(Roxb.) Codda-Pana.* Malabar. *(Rheede). Tallipot Palm.*

Obs.—I have no means of ascertaining that the foregoing specimens of inflorescence really belong to this species; not having access to a complete copy of Martius' Palms, where the necessary minute particulars can only be expected; but the probability is in favour of their belonging to *C. umbraculifera.* If this is the case, the æstivation of the corolla, and the shape of the ovarium will assist the specific distinction.

VIII. LICUALA.

Rumph. Hb. Amb. 1. *p.* 44. *t.* 9. *Thunb. Nov. gen. p.* 70. *Linn. Gen. Pl. ed. Schreb.* 2 *p.* 774. *ed Spreng. p.* 149. *No.* 1300. *Jussieu. Gen. Pl. p.* 39. *Gærtner. Sem. et. Fruct.* 2. *p.* 268. *t.* 139. *Syst. Veg. ed. Sch.* 7, *p.* 77. *No.* 1490. *Roxb. Fl. Ind.* 2. *p.* 179. *Icones. Suppt.* 3. *t.* 79. *Mart. Progr. p.* 9. *No.* IV. *Palmæ. p.* 234. *t.* 134, 125, 162. *Endl. Gen. Pl. p.* 252. *No.* 1755.

GENERIC CHARACTER.

FLOWERS hermaphrodite. CALYX and COROLLA each three-parted. STAMENS six, filaments often united into a ring, distinct from the corolla. DRUPE (only one matured), one seeded. ALBUMEN excavated in front. EMBRYO placed behind.

HABIT.—They are shrubby, sometimes stemless palms of the East Indies as well as the Island of the Eastern Archipelago.

The STEM in many is marked with rings, and sometimes rough with the persistent indurated bases of the petioles of falled leaves.

LEAVES pinnately fan-shaped, with the PETIOLES armed towards the margins with horny conical or often hooked prickles; PINNULES wedge-shaped, with their apex more or less truncate or lobed, and the lobes bifid. SPADIX spicately or paniculately branching.

SPATHES tubulose, their mouths obliquely bi-lobed. FLOWERS solitary binate or ternate.

OVARY vertically sculptured, carpels cohering at the apex.

DRUPES red.

1. LICUALA PALUDOSA.

TABS. CCXXI. A.B.C.

Trunco sublævi 8-12-pedali, petiolis apice inermibus; lamina flabelliformi, pinnis 7-9, lateralibus apice obliquis profunde et acute 3-4 lobis, lobis bipartitis, reliquis truncatis lobis 4-5, (vel terminali 7-8) latis brevibus bifidis, spadice foliorum circiter longitudine, ramis spicas plures nutantes secundas gerentibus, floribus glabris solitariis turbinatis, calyce cyathiformi integriusculo corolla sub-duplo breviore, ovario depresso-turbinato.

The *trunk* is eight feet, or from that to twelve feet high, about 1½ inch in diameter, unarmed, and almost without marks of annuli, except towards the apex where they are incomplete. *Crown* of moderate size. *Rete*, or woody fibres rather stout, of rich brown colour.

Ligula linear, one inch long, gradually attenuated towards the apex.

Petiole one and a quarter, to one and a half foot long, sub-trigonal, armed along the margins, except towards the apex, with small, black, horny, conical, curved teeth.

Lamina flabelliform, rather smaller than that of *L. spinosa*.

Pinnæ or *leaflets* eight or ten in number, cuneate, lateral ones oblique at the apex, deeply and acutely three or four-lobed, lobes bilobed (except the side ones), the others are more or less truncate, with four (or as in the terminal, five or eight), broad, short, bifid lobes.

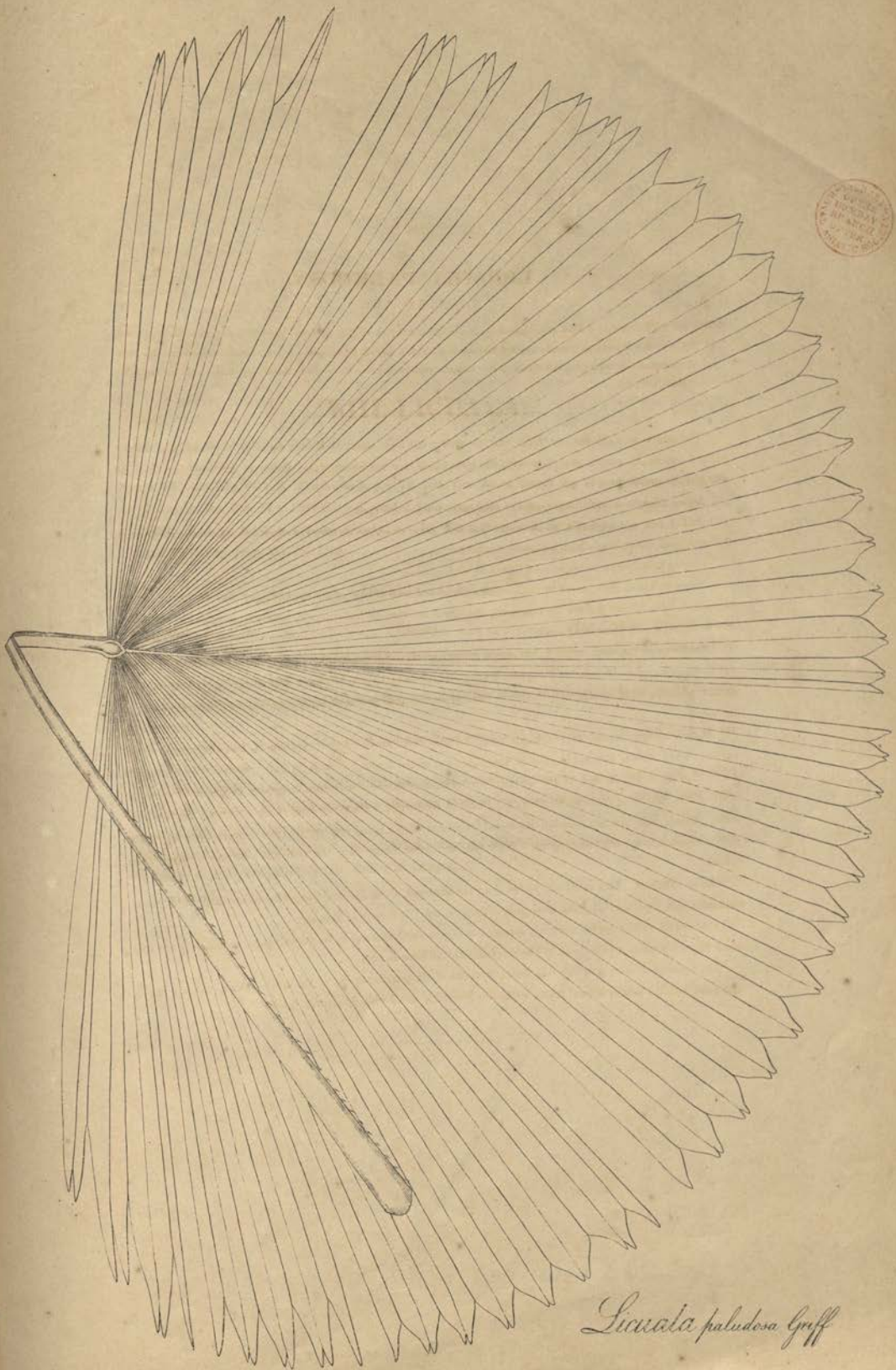
Spadix about the same length as the leaves, rather curved. *Spathes* tubular, green, with membranous or scarious lacerated mouths. *Branches* of the spadix bearing five, or seven spikes, which are four, or six inches long, curved, secund, generally nodding, slightly puberulous, often appearing as if they arose separately from within the mouth of the spathe.

Flowers solitary, sessile, of a turbinate form, smaller than usual. *Calyx* cup-shaped, half the length of the corolla, nearly entire, irregularly split at the expansion of the flower. *Corolla* (in bud) urceolate, about one-third longer than the calyx, divided to the middle into three, cordate-ovate segments. *Annulus* of the *stamina* white, nearly entire, projecting considerably above the throat of the corolla. *Filaments* (free) short, setiform. *Anthers* versatile, oblong, pale brown. *Ovarium* depressed, turbinate, with a horny sculptured vertex; carpels adhering by the style. *Ovula* solitary, erect anatropous. *Style* subulate, rather shorter than the ovarium. *Stigma* simple. *Fruit* not seen.

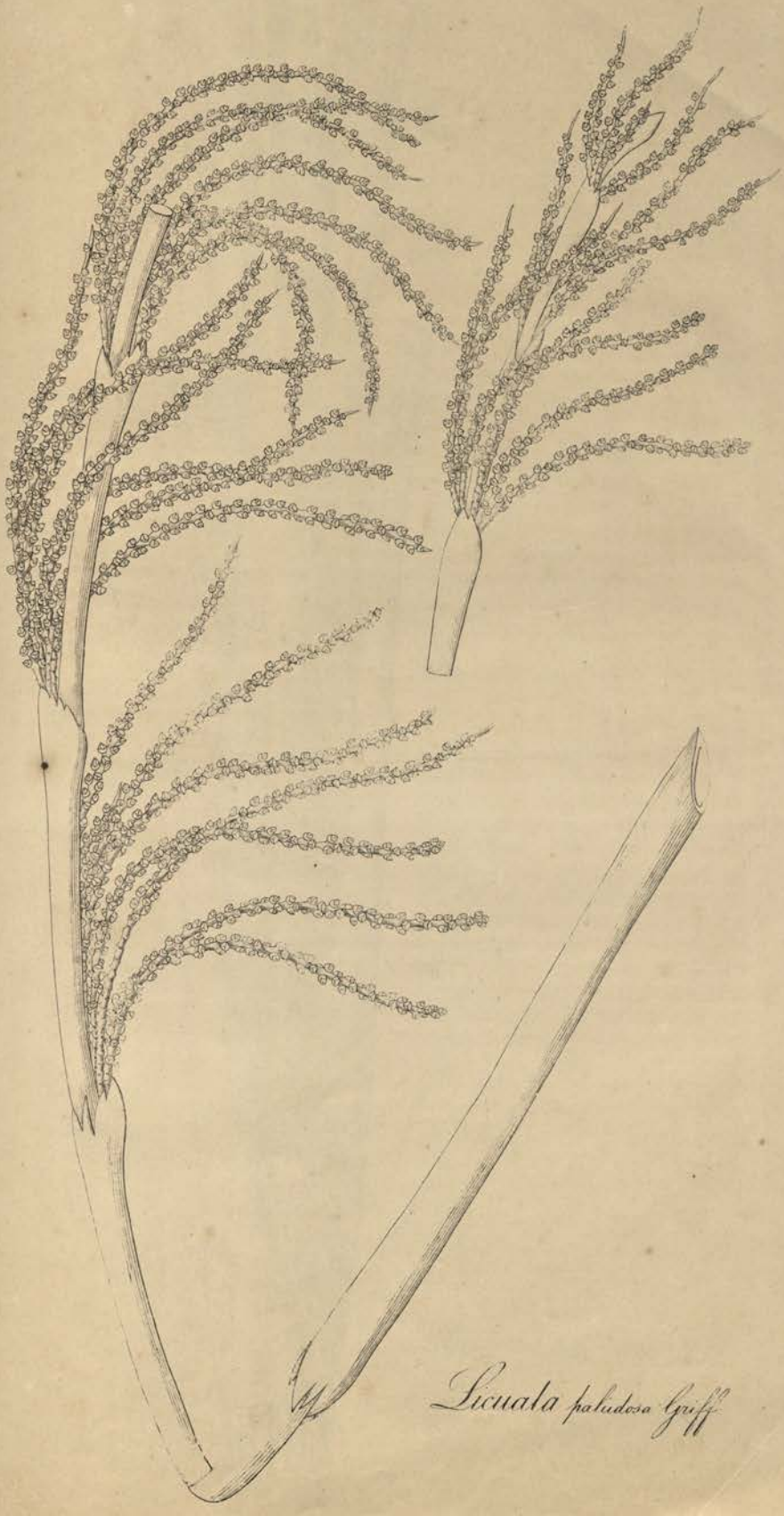
HAB.—Malacca. Low sandy wet places along the sea-coast, about Tanjong Cling, Roondoor, and Pulo Bissar, associated with *Pandanus*, *Eugenia*, *Diospyros*, *Helospora*, etc. It flowers in February.

OBS.—This species approaches to *L. spinosa*, but is abundantly distinct by its smooth stem, (which does not look much like the stem of a palm), and by the short smooth turbinate flowers.

The tracts of country in which it is found, form one of the peculiar marks of the Straits' Flora, and are highly contrasted with the muddy littoral tracts, which are covered as usual with Mangrove jungle.



Licuala paludosa Griff



Licuala paludosa Griff.

Lucuala palustosa Griff.

2. LICUALA SPINOSA.

Licuala spinosa, *Willd.* 2. *p.* 201. (excl. syn. Rumph.) *Roxb. Fl. Ind.* 2. *p.* 181 ? (excl. syn. Rumph. et Lam.) *Syst. Veg. ed. Sch.* 2. *p.* 1301. *Mart. Palm. p.* 235. *t.* 135. I. II.

Trunco 8-12-pedali annulato vel aspero, petiolis per totam longitudinem armatis, lamina orbiculari-reniformi, pinnis sub 18, lateralibus oblique præmorsis 3-4-lobis obtuse bipartitis, terminali 10-11-lobo, intermediis 3-5-lobis obtuse bifidis, spadice foliorum circiter longitudine, ramis 3-7 spicigeris, spicis subulatis pubescentibus, floribus bi-ternatis extus pubescentibus, calyce ovato ad medium rotundato tripartito, bacca obovato-oblonga.

This is a stout palm, ten or twelve feet high, forming dense bushy tufts.

Trunk two to four inches in diameter, eight or ten feet high, marked with the scars of the fallen petioles.

Leaves six or seven feet long.

Petiole about four, to four and a half feet long, obtusely trigonal, margins armed throughout with stout conical somewhat curved aculei.

Lamina in outline orbicularly reniform, about four feet across the broad diameter.

Pinnules about eighteen in number, narrow cuneate; the central ones about two feet long; the terminal one is ten or eleven plicate, truncate, with as many lobes as plaits, the lateral ones are the deepest, all are obtusely bifid. the intermediate ones are more or less truncate, three to five-lobed, lobes larger and deeper, but otherwise similar to those of the terminal one, the lateral ones with oblique three lobed ends.

Ligula very narrow, one to one and a half inch long, scarious.

Spadix a little longer than the leaves, branches seven to ten, adnate to the axis as high as the points of the spathes. *Spathes* green, sprinkled with brownish scurf, with scarious lacerated ends, occasionally obliquely lacerated. *Spikes* of the lower branches several, stout, subulate, downy, spreading, generally secund.

Flowers sessile, placed in two's or three's, small, nearly ovate. *Calyx* sub-ovate, divided to the middle into three rounded teeth. *Corolla* a little longer than the calyx, divided below the middle into three broad lanceolate, acuminate segments. *Annulus* rather high, nearly entire. *Filaments* (free), short, setaceous. *Anthers* oblong-ovate. *Ovarium* depressed, turbinate, sculptured at the apex. *Style* filiform, rather longer than the ovary.

Fruit as though stalked by the cylindrical tube of the calyx, surrounded at the base by the perianth, oblong, red, one-seeded. *Seed* ovate, with an intrant process curved towards the middle of the dorsum. *Albumen* horny, on a transverse section horse-shoe-shaped. *Embryo* about central.

Hab.—Malacca. Common in wet places, particularly in hedges, Malayan name, *Plass*. It is cultivated in the H. C. Botanic Garden, where in flowers in the cold, and ripens its fruit in the hot season.

Obs.—This species appears to vary a good deal; it is not improbable that two species lurk under this name. Some of my Malacca specimens have the trunk armed with the hardened bases of the petioles, with more slender spadixes, and considerably smaller fruit.

It approaches in the leaves to *L. peltata*, especially in the division of the ends of the pinnules, but it is otherwise obviously distinct; it is the only species I know that grows in bushy tufts. Its nearest affinity is with *L. paludosa*.

Rumph's figure * (Hb. Amb. 1. t. 9.) quoted for this, appears to me to refer to a distinct species, particularly as regards the spathes, and the erect simple spikes.

* See Mart. Palm. p. 236. adnot. where the name L. Rumphii is proposed for this species.

3. LICUALA PELTATA.

TAB. CCXXII.

Licuala peltata. *Roxb. Fl. Ind.* 2. *p.* 179. *Icones. Suppt.* 3. *t.* 79. *Hamilton Comm. Herb. Amb. in Mem. Wern. Soc.* 5. *p.* 313. *Mart. Palm. p.* 234. *t.* 162.

Trunco robusto 3-4 pedali, petiolis per totam longitudine armatis, lamina orbiculari-peltata, pinnis 18-20, lateralibus spice obliquis profunde et acute 3-5 lobis, lobis bipartitis, reliquis truncatis plurilobatis, lobis obtuse bifidis, spadice foliorum circiter longitudine, spicis simplicibus pendulis secundis pubescentibus, floribus solitariis (maximis) extus pubescentibus, annulo staminum nullo, ovario depresso turbinato stylo triplo breviore, bacca obovata, processu intrante sursum latissima obliqua, embryone infra medium seminis.

The description of this species is here drawn up from plants in the Botanic Gardens.* It is a low Palm, with a stout stem three or four feet high, marked below with the scars of the fallen leaves, above rough from the persistent bases of the petioles.

Leaves eight or ten feet long, with copious. *Rete* at the bases of the petioles. *Petiole* six or seven feet long, triangular, armed throughout along the margins, especially towards the base, with stout, horny, black, very sharp, conical, and rather curved thorns. *Ligula* cordate, when young the margin is very elevated and tomentose. *Lamina* peltate; *Pinnæ* about eighteen or twenty in number, describing nearly a circle of about six feet in diameter, about three feet three inches long, outermost ones cuneate-oblong, three or five-plaited, three or five-lobed, lobes acutely bilobed, with oblique ends; the intermediate and terminal ones much broader, seven or eight inches across truncate with several plaits and as many less deep, broader, rather obtuse, bifid lobes.

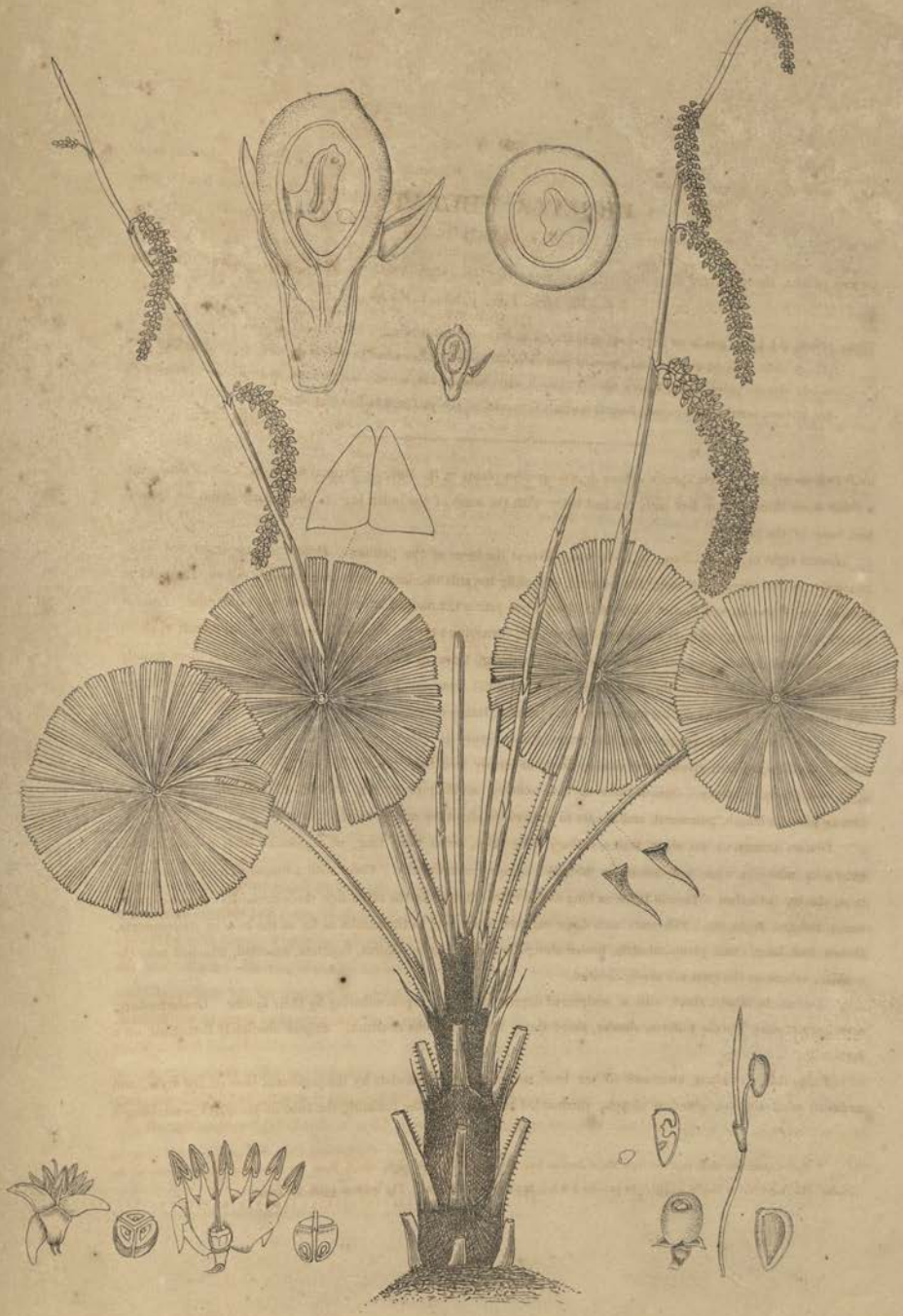
Spadix erect, rather longer than the leaves, stout, simply branched, sprinkled in the upper parts with brown scurf. *Spathes* tubular, green, lower ones a foot, or nearly two feet long, bilobed at the apex, at length variously split, and similarly scurfy. *Spikes* three to five, solitary, nodding-pendulous, secund, centrifugally developed, a foot or more in length, pubescent, and adnate to the axis to about the middle of the spathe.

Flowers numerous, on short stalks, solitary, very large, seven lines long, of a greenish white-colour, covered externally with the same pubescence as the spike, opening centrifugally. *Calyx* with a funnel-shaped or obconical tube, shortly 3-toothed. *Corolla* twice as long as the calyx, divided to the calyx into three broadly lanceolate, coriaceous, reflexed segments. *Filaments* united among each other, and to the corolla as far as the base of its segments, thence free, long, stout, plano-subulate, keeled along the back. *Anthers* linear, sagittate, exserted, attached near the middle; otherwise the cells are nearly distinct.

Ovarium turbinate, short, with a sculptured depressed apex; carpels cohering by their apices. *Ovula* solitary, erect, anatropous. *Style* filiform, slender, three times longer than the ovarium. *Stigma* obsoletely 3-toothed, on a level with the anthers.

Fruit obovate, oblong, attenuate to the base, red, one-seeded, apiculate by the persistent base of the style, and crowned with the two abortive carpels, surrounded at the base by the perianth, the tube of the calyx resembling a

* Entire specimens since received from Major Jenkins have the stem 3½-4 feet high, rough from the persistent, distant bases of the petioles; the leaves 12-14 feet in length; the petioles 8-9 feet and armed throughout. The spadices equal the leaves.



Licuala peltata

short pedicel. *Seed* oblong; excavation passing in above the hilum, oblique, reaching nearly to the apex of the seed, dilated upwards. *Albumen* horny. *Embryo* situated below the middle.

HAB.—Woody mountainous country to the eastward of and near Chittagong, *Roxburgh*; Mountains beyond the Ganges Himalayan range, below Darjeling, Rungpore, *Buchanan*; Assam, *Major Jenkins*; Cultivated in H. C. Bot. Gardens, flowering in the cold season, fruiting in the hot season. *Kurud, Kurkuti.* Bengally. *Chattah Pat.* Assamese.

OBS.—This, which is the largest and finest species of the genus, is not likely to be confounded with any other. Its large peltate orbicular leaves, simple large pendulous spikes, and comparatively very large flowers, will at once distinguish it. In the leaves it is allied to *L. longipes*, but that species is almost stemless, the leaves are also dark green, and differently lobed. Martius' figure of the entire plant gives a much better idea of *L. spinosa* than of this species.

Major Jenkins informs me, "the leaves of the Chattah Pat are used for the same purposes as those of the Toko but are much coarser, and only made use of by the lower orders. The demand for them is very great, scarcely a single ploughman, cow-keeper or cooly, but has his Jhapee or Chattah made of Chattah Pat."

4. LICUALA ACUTIFIDA.

TABS. CCXXII. A.B.

L. acutifida, *Mart. Palm. p.* 237. *t.* 135, iii. iv. (excl. syn. Roxb.)

Trunco gracili, foliis flabelliformibus, pinnis 50-20 subæquilatis anguste cuneatis tricarinatis, latearlibus apice obliquis inæqualiter 3-4-lobis, terminali 4-5-lobo, intermediis trilobis lobulis (lateralibus exceptis) bipartitis sinubus acutis, spadice folia subæquante cum spicis floribusque fusco-pubescenti-hirto, ramis simplicibus vel bipartitis, spathis bilobis sericeo argenteove paleaceis, floribus inferioribus binatis superioribus solitariis, petalis calyce obconico ad medium tripartito longioribus, seminis pisiformis processu intrante cylindraceo rectiusculo.

The description of this species is founded upon specimens, of three entire small plants, several specimens of inflorescence, and a few ripe seeds. It is a small miniature Palm. The *trunk* being only from three to five feet high, (but according Mr. Lewis), sometimes it attains fifteen or twenty feet, ten or eleven lines in diameter above, and about twenty-two lines in diameter at the base, marked with incomplete rings, to which portions of the base of the petioles adhere.

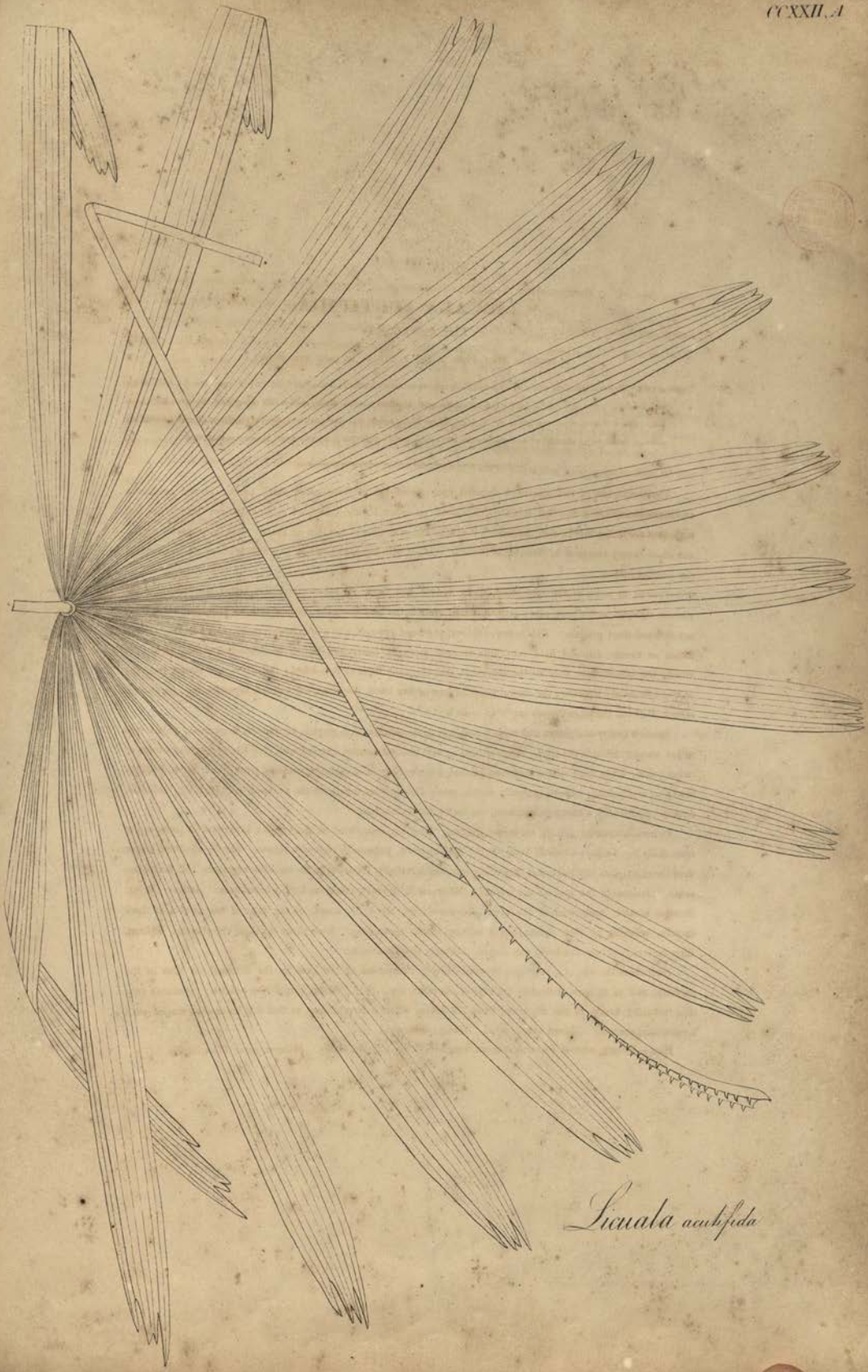
Petioles in some of the specimens $3\frac{1}{2}$ to 4 four feet long, in others (and this seems the natural state) scarcely eighteen inches long, plano-convex, armed towards the base along the margins with tooth-shaped, straight or sub-deflexed short prickles. *Rete* brown, copious, produced upwards into a long brown membranous ligula. *Pinnæ* fifteen or twenty, disposed in a subpeltate manner, generally linear-cuneate, ten or eleven inches long, eight lines broad; the intermediate ones are the narrowest, and unequally three or four-lobed; the others are three-lobed, the central lobe deeply bipartite; the central pinnules four or five lobed, (the inner lobes deeply bipartite, the lateral ones entire). Between the lobes threads are often to be found.

Spadices twelve or eighteen inches long, nodding, covered below with greyish, above with ferruginous pubescence rather stouter towards the apex. *Spathes* tubular with oblique mouths, covered with grey silvery adpressed hairs or rather paleæ; limbs more or less lanceolar, bilobed, lobes ending in acuminate scarious points; the second spathe nearly six inches long. *Spikes* generally simple, rarely dichotomous, adnate to the peduncle very high up, subulate, densely covered with a tawny pubescence; the lowest five inches long.

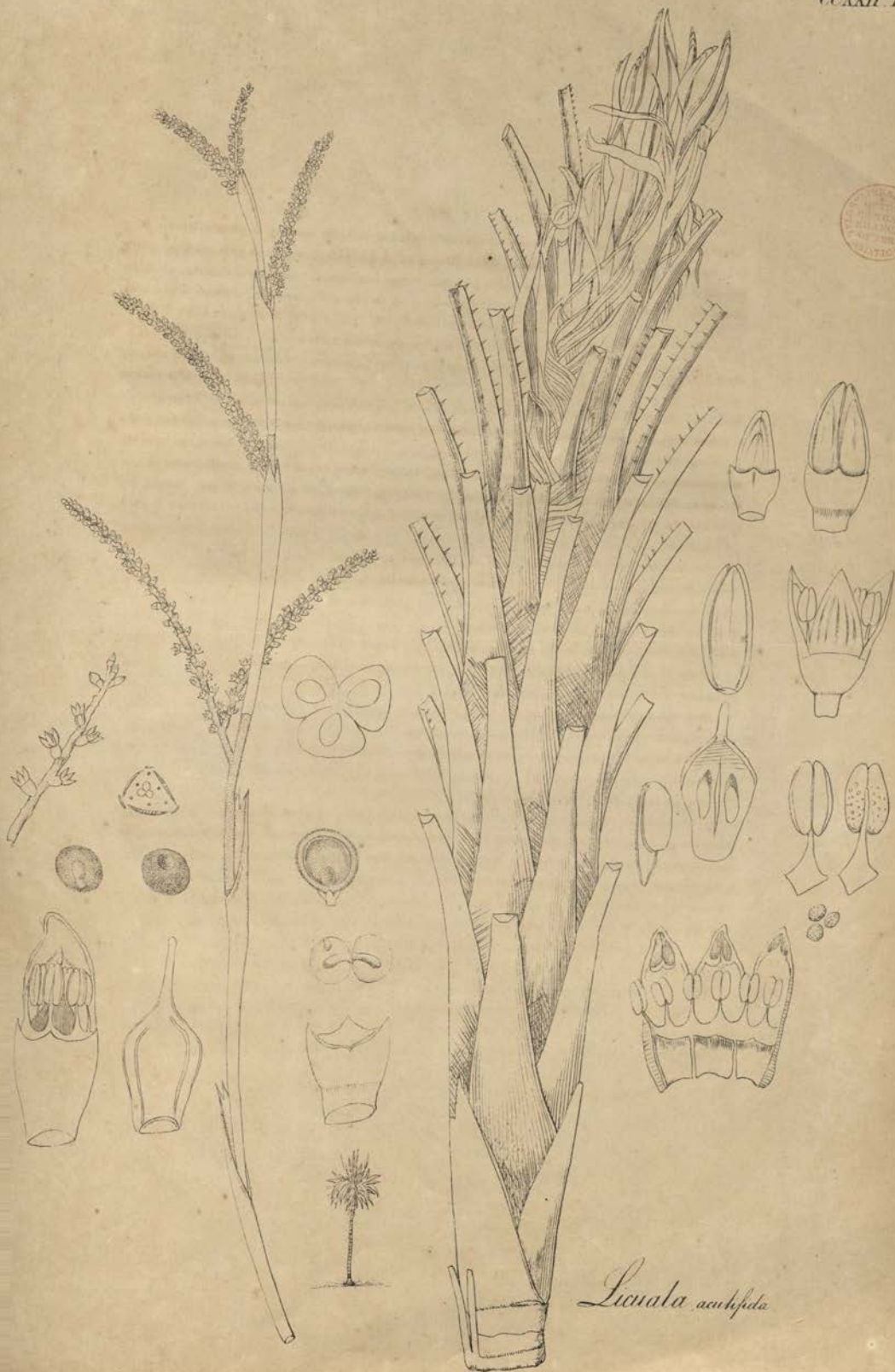
Flowers numerous, sessile, spreading in every direction, articulated on short stalks, lowermost in pairs, upper ones solitary. *Calyx* obconical, trifid to the middle, tawny pubescent, segments obtuse. *Corolla* one-third longer than the calyx, similarly pubescent externally, furrowed internally, tripartite to the middle, segments half lanceolate acute. *Annulus* of the *stamens* six toothed. *Filaments* (free) short, setaceous from a broad base. *Anthers* oblong. *Ovarium* smooth, sculptured at the apex, obovate-oblong, about the length of the tube of the corolla, of three carpella, cohering by their apices; *ovula* solitary, erect, anatropous. *Style* about equalling the stamina, filiform, three-sulcate. *Stigma* obsoletely cup-shaped, obscurely three-denticulate.

Fruit about the size of a large pea, roundish-oblong, surrounded at the base by the flattened-out limb of the perianth, and as it were, stalked by the tube of the same, dry. *Seed* pisiform, tinged with reddish; teguments very thin, adhering firmly to the albumen; from the hilum enters a deep process, so that it is horse-shoe shaped on a longitudinal section. *Albumen* horny, equal. *Embryo* subcentral.

HAB.—Penang, whence I have specimens from Mr. Lewis, and Dr. Oxley. Malayan name *Plass tikooss.*



Licuala acutifida



Licuala acutifida

Obs.—The stems of this plant afford the well known walking sticks known by the name of "Penang Lawyers." These are prepared by scraping with glass, and polishing. Mr. Lewis informs me, that each stem is well-scraped, by which the epidermis is altogether removed; care must be taken not to take away much more, as the inside is like the substance of a rattan. It is on this account that the smaller, thinner sticks are so much sought for, and are so rare. The sticks are then straitened by fire. No other process is used.

The plant seems to be confined within narrow geographical limits; it is not known I believe about Malacca, where its place seems to be supplied by the following closely allied species. Martius, however, states it to be found throughout the Malayan peninsula.

I have an impression that under this species as given by Martius, two distinct ones will be found; for though the description agrees well with my Penang specimens, yet the drawing of the spadix represents the parts nearly of the same size as in *L. spinosa*.

L. pumila, Blume, appears only to be distinguished from this, by the broader equal teeth of the pinnules (the intermediate ones of which are the broadest) being described as sixteen to twenty-one lines broad, and six to eight toothed, while the two innermost ones are said to be only an inch broad.*

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* Syst. Veg. ed Sch. 7, 2. p. 130.

5. LICUALA GLABRA.

TAB. CCXXIII.

Trunco gracili 3-5 pedali, foliis flabelliformibus, pinnis 16 subæquilatis lineari-cuneatis tricarinatis, lateralibus apice 3-4-lobis dentatisve, terminali 4-lobo, intermediis trilobis lobis (lateralibus exceptis) obtusissimis bipartitis sinubus latis, spadice folia subæquante cum spathis spicis floribusque glabro, ramis 3-5-partitis, spicis gracilibus, floribus inferioribus binatis, calyce cyathiformi brevissime tridentato, corolla triplo longiore infra medium tripartita, ovariis usque ad medium cohærentibus.

This is a miniature palm, the *trunk* being from three to five feet high, and rather more slender than that of the preceding. The *petiole*, the *rete*, and the *ligula* are much the same as those of the preceding. The *lamina* is of the same size as that of the preceding, flabelliform; the *pinnules* about sixteen in number, linear-cuneate, tricarinate, the lateral ones obliquely and unequally three or four toothed or lobed, the central one four-lobed, the two inner lobes bifid, the rest three-lobed with the central lobe bifid; all the divisions obtuse.

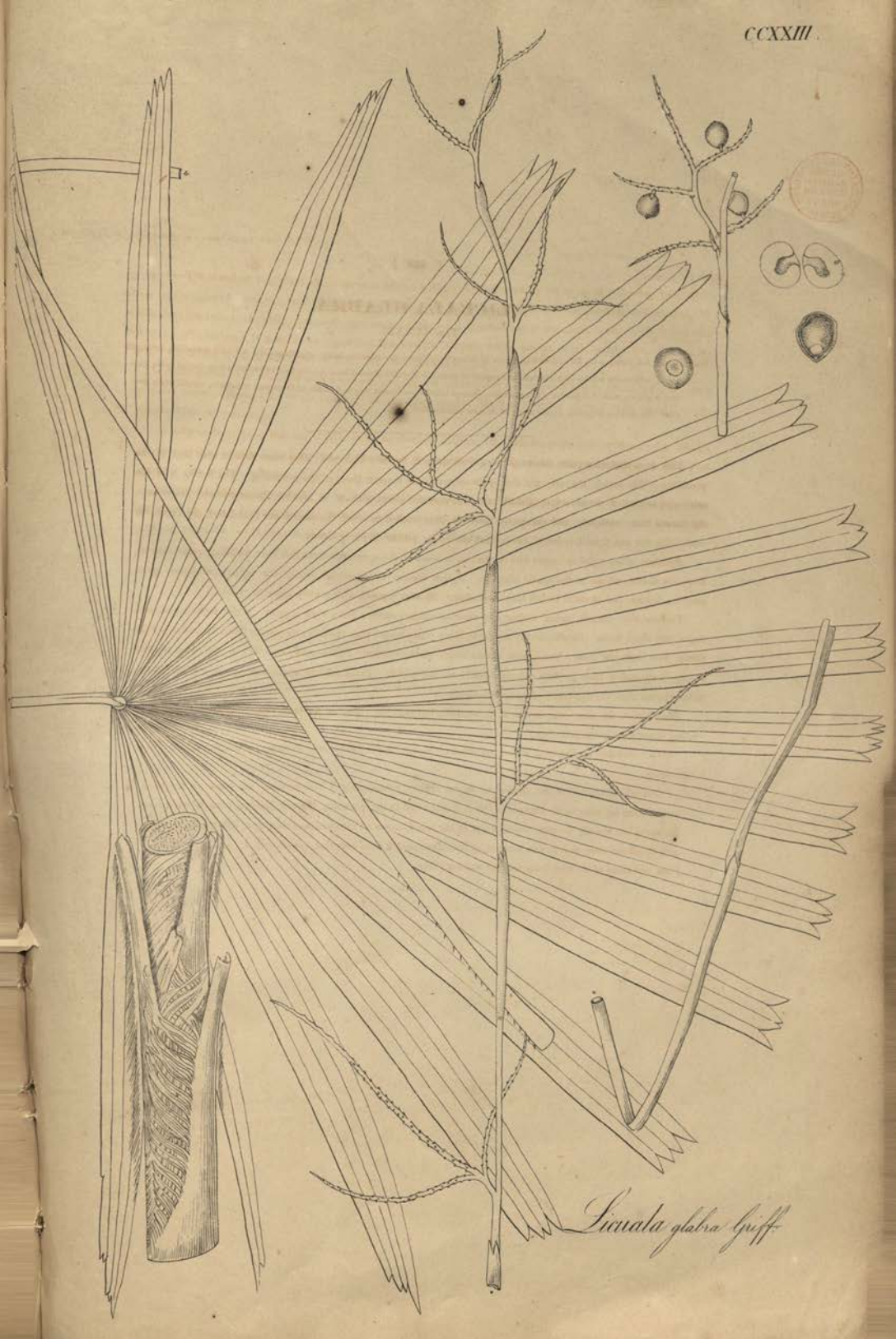
Spadices about equal in length with the leaves, in some of the specimens three feet long, nodding, quite smooth. *Branches* distant, adnate to the spadix high up. *Spikes* several on one branch (except the uppermost ones), quite smooth, slender, two or three inches long, spreading. *Spathes*, smooth with acutely bipartite points.

Flowers also smooth, rather distant, on short articulated stalks; lower ones in pairs. *Calyx* cup-shaped, with three very short teeth. *Corolla* deeply tripartite, three times longer than the calyx, segments linear lanceolate. *Filaments* (free) subulate from a broad base, rather long. *Anthers* ovate. *Pollen* ovate, one-plicate. *Ovarium*, obovate oblong, composed of three carpella adhering nearly to the middle *Ovula* solitary, erect, anatropous. *Style* filiform rather shorter than the ovarium. *Stigma* sub-simple.

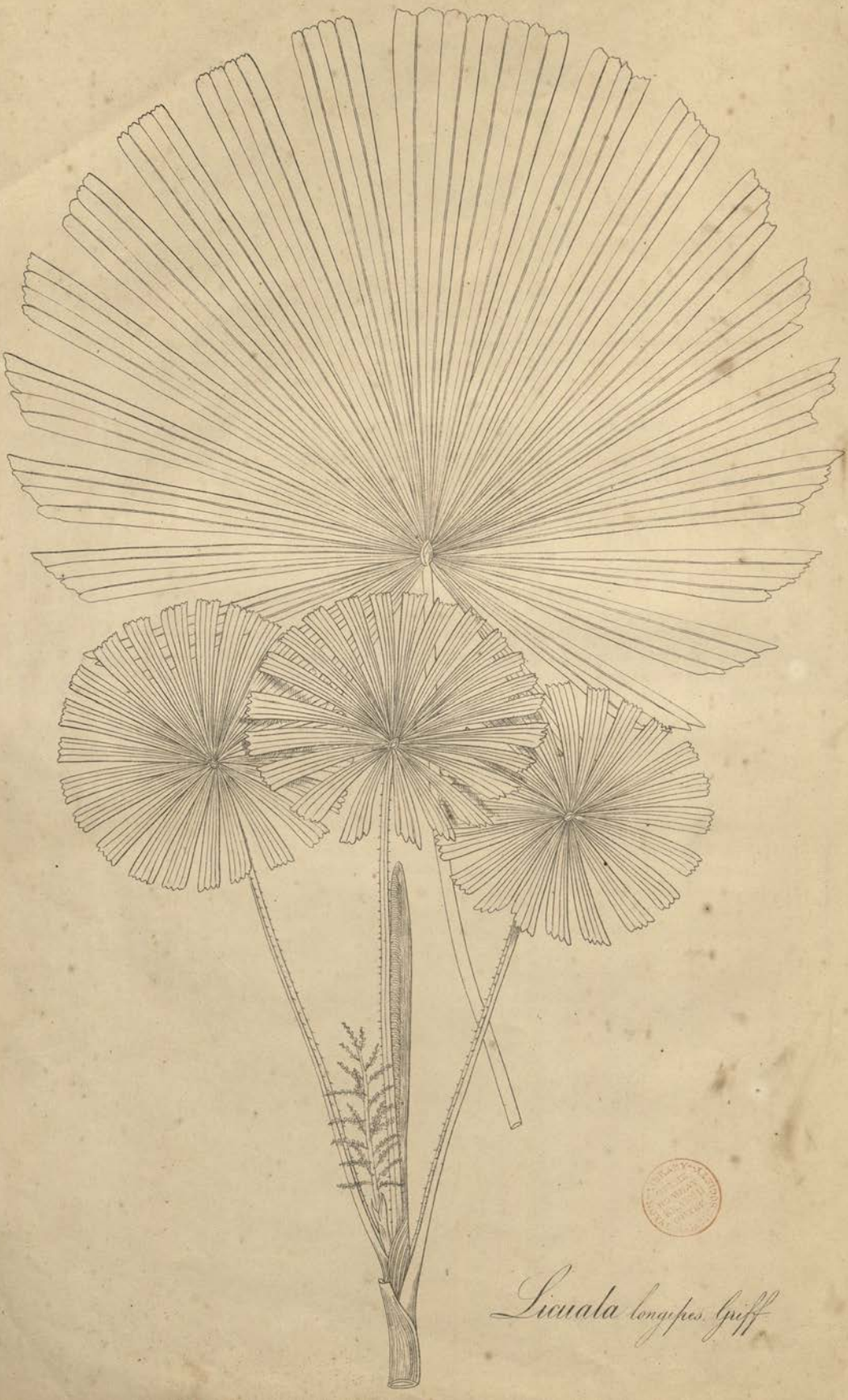
Fruit about the same size as that of *L. acutifida*, but obovate. *Seed* of the same shape, the intrant process is rather larger than in the preceding.

HAB.—Solitary on Goonong Miring, an offset of Mount Ophir. Flowers in February. Malayan name, *Plass Goonoong*.

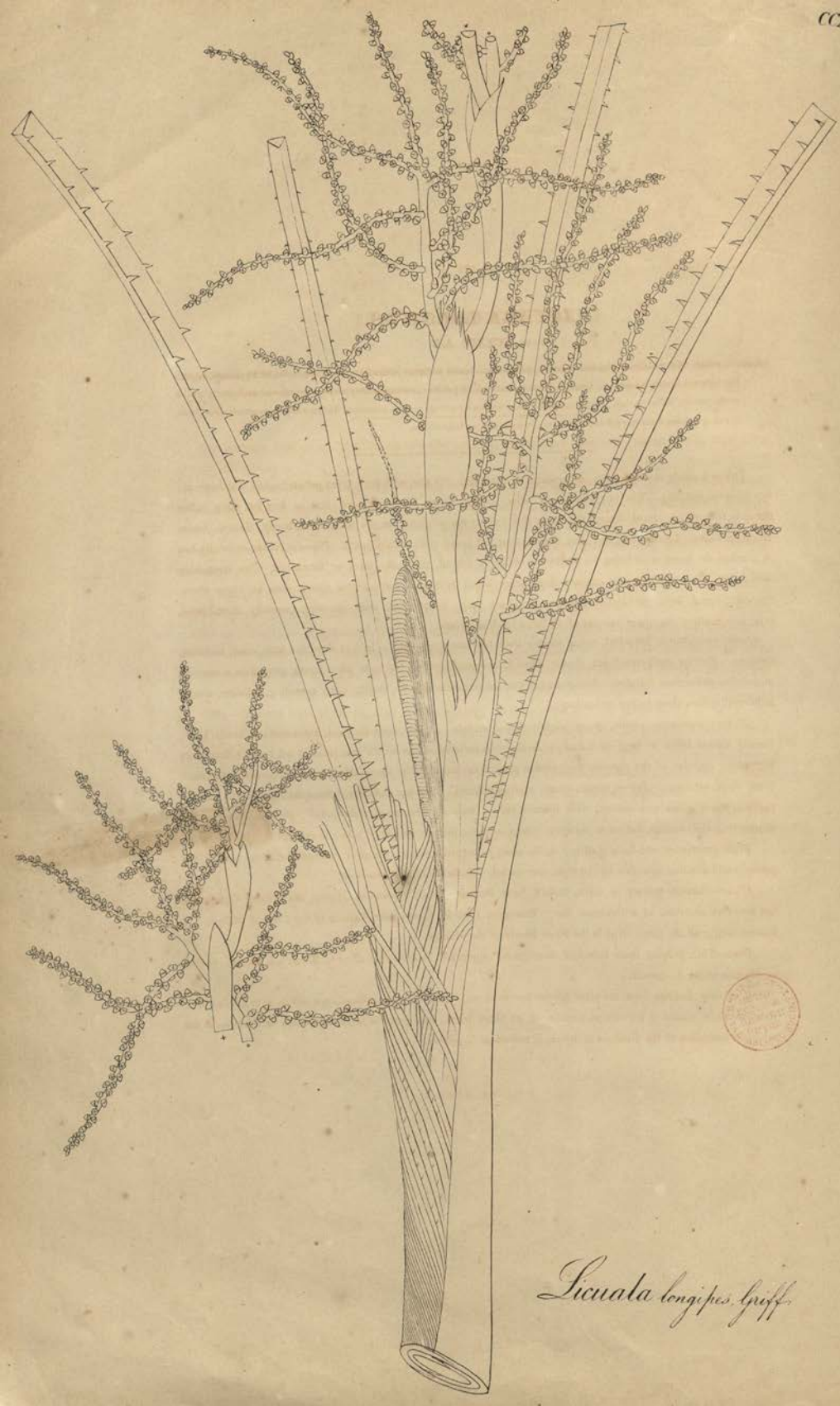
OBS.—I first met with this species on Mount Ophir; subsequently I have received specimens of the same locality from my collector E. Fernandez. It is closely allied to the preceding, (Penang Lawyer), from which indeed the leaves are scarcely distinguishable, except by the broad sinuses of the lobes, and their more obtuse points. The smooth inflorescence and flowers however, at once distinguish it from both that species and *L. pumila*, of Blume. I am not aware of its stem being used for walking sticks.



Licuata glabra Griff.



Licuala longipes Griff



Licuala longipes. Griff.

6. LICUALA LONGIPES.

TABS. CCXXIV. A.B.

Subacaulis, petiolis (4-5 pedalibus) triquetris apicem versus inermibus, lamina orbiculari-peltata (atro-viridi), pinnis circiter 20 cuneatis, lateralibus oblique truncatis 3-4-dentatis, terminali latiore truncata sub 11-dentata, dentibus omnibus bifidis et irregulariter denticulatis, spadice erecto petiolis multo breviore thyrsoideo-ramoso, spicis (ramorum pluribus) undique patentibus, floribus solitariis numerosis parce pilosis, calycis cylindracei dentibus rotundatis bifidis, ovario medium supra fusco-villoso.

This is a nearly stemless palm; otherwise it is of considerable size, with dark green peltate leaves. The *leaves* are five to seven feet long. The *rete* consists of stout leathery fibres. *Petioles* stout, four or five feet long, rather obtusely triquetrous, armed (except the upper third) along the two inner angles with stout, horny, conical, tooth-shaped prickles. *Lamina* 2-2½ feet long, three or four feet broad, peltate-flabelliform. *Pinnules* twenty or twenty-two in number, the lateral ones being the narrowest, obliquely cut off, unequally three or four-lobed, lobes irregularly denticulate; the terminal one cuneate, five inches broad, truncate, eleven-keeled above, with as many short, truncate, broad, bifid, denticulate lobes as there are keels: intermediate ones narrower, generally three-keeled, otherwise similar: the upper margins of all being blackish-brown.

Spadix stout, much branched, much shorter than the leaves, one and a half, to three feet long, erect, undulate, flexuose. *Spathes* compressed, lax, almost inflated, laceroso-fibrous at the ends, when young, grey, from a covering of cellular paleaceous cellules. *Branches* adnate to the peduncle high up, bearing many spreading, subulate, scurfy-pubescent spikes, three to five inches long.

Flowers numerous, sessile, green, slightly hairy outside. *Calyx* subcylindrical, three-toothed, teeth bifid *Corolla* almost twice as long as the calyx, divided to a little below the middle into three broad, cordate, lanceolate segments. *Annulus* of the *stamina* subtruncate, projecting considerably above the faux of the corolla. *Filaments* (free) short, setiform. *Anthers* cordato-ovate, slightly inflexed. *Ovarium* turbinate, toward the base smooth and tri partible, above entire and covered with fuscous villi. *Ovule* solitary, erect, anatropous. *Style* cylindric, rather shorter than the ovarium, hollow at the apex. *Stigmas* three, minute, on a level with the annulus.

Fruit (immature) sub-bacate, sitting on the stout pedicel-like tube of the calyx: surrounded at the base by the perianth and annulus, apiculate by the style, one seeded. *Endocarp* thin, sub-osseous.

HAB.—Malacca, solitary in dense forests, Ayer Punnus (Rhim) Goonoong Miring, and Mount Ophir, but not above an elevation of a thousand feet. Tenaserim coast in forests near Lainear to the south of Mergui. It flowers nearly all the year. And is the *Plass Bhatto* of the Malays.

OBS.—This, judging from Schultes' description,* appears to be somewhat allied to Blume's *L. ramosa*, quoted by Martius under *L. spinosa*.

It is very distinct from the other species known to me, especially in its inflorescence, which is so divided and short as to be almost a thyrsiform panicle, in its short trunk, but otherwise large stature and dark leaves, in the orbicular spreading of the divisions of which, it resembles *L. peltata*.

* Syst. Veg. ed Schultes.

7. LICUALA TRIPHYLLA.

TAB. CCXXV.

Nana, subacaulis, pinnis tribus pluridentatis (dentibus marginali excepto emarginatis), lateralibus oblique cuneatis præmorsis, terminali abrupte præmorsa, spadice foliis breviore vix spithamaeo, floribus paucis solitariis, fructibus pisiformibus processu intranti curvato.

This is a very small dwarf Palm, the whole height not exceeding two and a half feet; the *stem* being about three or four inches long.

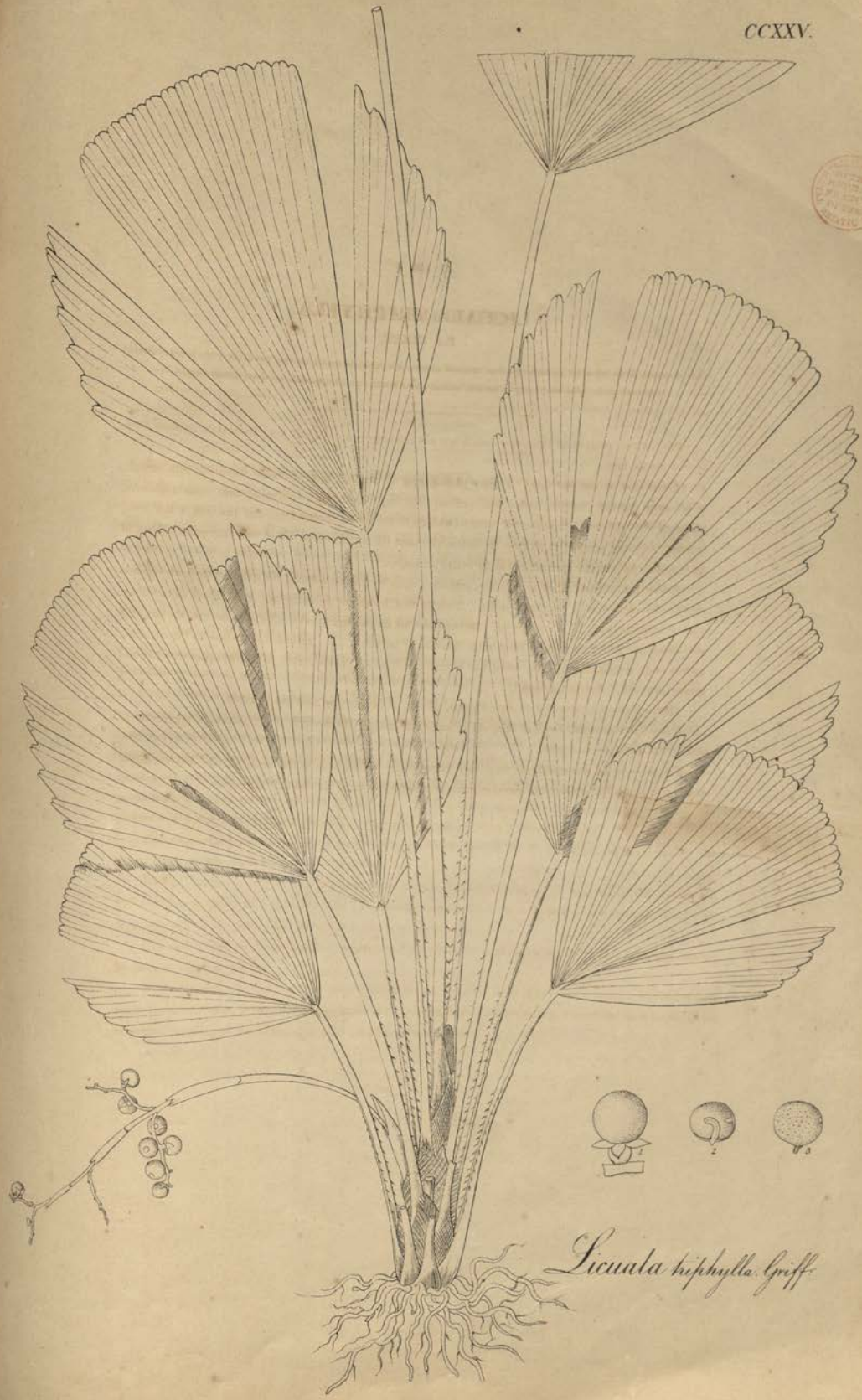
Leaves one or two feet long. *Petioles* plano-convex or canaliculate, armed below the middle with straight or somewhat hooked, deflexed, rather long prickes. *Rete* well developed. *Lamina* of three cuneate *pinnules*, the lateral ones obliquely præmorse, the terminal (which is five or six inches long, and two and a half wide) truncate: as many short teeth as there are carinæ, all except the lateral one on either side emarginate; those of the terminal one being the shortest, and about twelve in number.

Spadix (fruit-bearing) nodding, cernuous, scarcely a span long, smooth, except the spike-bearing part, which is scurfy-pubescent. *Spathes* smooth, bipartite. *Branches* four, lowermost dichotomous. *Spikes* about an inch long, marked with the scars of a few flowers. *Berries* about five on the largest spike, sub-distichous, red, the size of a pea, seated as it were on a short stout stalk (the tube of the calyx), and surrounded at the base by the spreading cordate-ovate acuminate segments. *Seed* like a small pea. *Intrant process* curved, so that its upper part becomes nearly horizontal. *Embryo* subcentral.

HAB.—Malacca in dense forests, Ayer Punnus, (Rhim). Only one specimen was procured.

OBS.—The stature and leaves of this, will at once distinguish it. In the teeth of the pinnules it approaches *L. pumila*, and especially *L. longipes*.

It appears to be distinguishable from very young plants of *L. spinosa* by the longer petioles, and less deeply toothed pinnules. The perianthium also does not appear to be pubescent, and the fruit is pisiform.



Licuala triphylla. Griff.

IX. LIVISTONA.

R. Br. Prod. Fl. Nov. Holl. ed. 2da. 123. *Syst. Veget. ed. Schult.* 7. *No.* 1491. *P.* 1307. *Mart. Progr. Palmar. Palm.* 102 (part. sub nom. Coryphæ rotundifoliæ) 100, part. 110, 111, 135, 145, 146. *Endl. Gen. Pl. p.* 252. *No.* 1754. Livistonia, *Gen. Pl. ed. Spreng. p.* 283. *No.* 1465. Saribus *Rumph. Hb. Amb.* 1. *t.* 8.

GENERIC CHARACTER.

FLOWERS hermaphrodite. CALYX and COROLLA each three-parted. STAMENS 6, filaments free from the corolla, distinct from each other, and dilated at the base. STIGMA sub-simple. DRUPE, only one matured, one seeded. ALBUMEN excavated in front. EMBRYO placed behind.

HABIT.—Perennial, often arboreous palms, native of Eastern Asia and Australia. PETIOLES of the leaves often armed, and the LAMINA deeply divided into bi-lobed segments which are sometimes acuminated and pendulous, the lateral ones being the longest. RETICULATED fibres at the base of the petioles copious. SPADICES axillary paniculately branching, peduncle covered by the sheath of the SPATHES. FLOWERS minute, white, clustered. DRUPE often unequilateral, of shining glossy blue colour.

OBS.—The true distinctions between this genus and *Licuala*, depends chiefly the palmate fan-shaped leaves, in the filaments although expanded at the base, being scarcely united into a free ring, and in the blue colour of the berry. The structure of the fruit in both is the same.

1. LIVISTONA JENKINSIANA

TABS. CCXXVI. A.B.

20-30-pedalis, petiolis pertotam fere longitudinem armatis, lamina (foliorum) reniformi-flabelliformi diametro extremo 5-6 pedali subtus glauco pruinosa, segmentis 75-80 obtuse bilobis, lateralibus sub-1½ pedalibus duplo longioribus, calyce rotunde et membraceim 3-dentato, fructibus subreniformi-rotundis magnitudine globuli sclopeti.

The description is taken partly from living plants observed at Gubroo, partly from specimens received from Major Jenkins. It is twenty or thirty feet high, with a thick round crown.

Trunk in diameter six or seven inches, rough towards the apex from the adhering bases of the petioles.

Leaves six or seven feet long. *Petiole* channelled above, armed almost to the summit, *ligula* cordate. *Lamina* reniform flabelliform, greatest breadth five or six feet, length from the apex of the petiole three or three and half feet, divided into about seventy-six or eighty, obtuse, bilobed segments, of which the extreme lateral ones are the deepest, being eighteen-inches long, while the central ones are scarcely half that length, under surface glaucous cæsious. The outline of the undivided part is almost exactly cordate.

Spadices axillary, two or three feet long; branches a span or a foot long, dichotomous opposite the ends of the spathes; branchlets (spikes) lowermost two or three times divided, the others simple. *Spathes* chesnut red, sometimes split, concealing the greater part of the peduncle; scurfy outside, the one next the first branch 1 to 1½ foot long, three or five keeled, with a large, oblong, deeply bilobed, split limb.

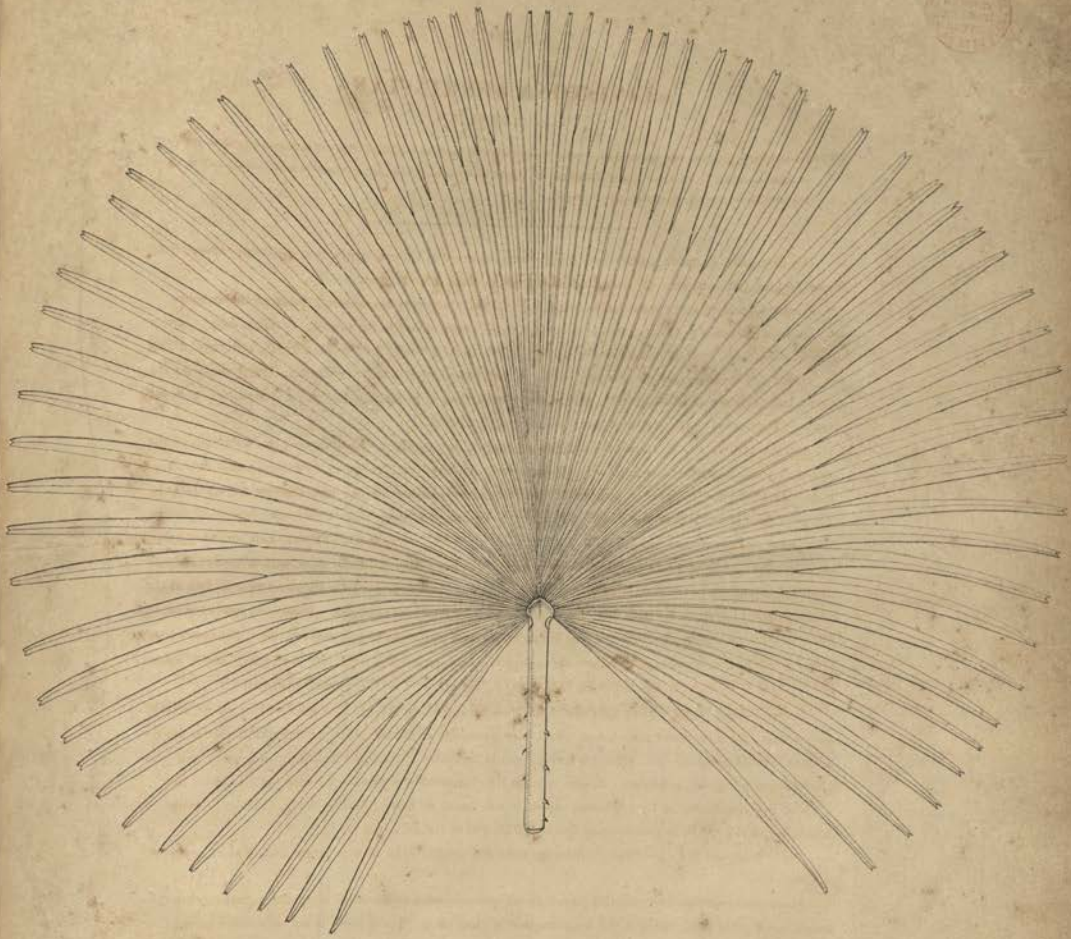
Spikes to each branch many, four to six inches long, spreading, rather stout. *Flowers* small, several together, sessile or raised on small knobs, greenish, without bracts. *Alabastra* oblong. *Calyx* short, with a broad as it were lobed base, cup-shaped, with three short rounded teeth with membranous margins. *Corolla* about twice as long as the calyx, divided to a short distance from the middle into three triangular segments. *Stamens* six, united as usual. *Filaments* free (at the faux), short, setaceous from a very dilated base. *Anthers* oblong, versatile. *Pollen* lanceolar with one fold. *Ovarium* obconical, yellow, with a depressed, red spotted, somewhat sculptured apex; *carpels* cohering by means of the short trisulcate filiform style. *Stigma* simple. *Ovule* solitary, erect, anatropous.

Drupe reniform, round, slightly attenuate at the base, the size of a musket ball, of a leaden blue colour, marked on one side with a depressed whitish line. *Seed* erect, presenting on the side corresponding with the above line on the fruit, a broad raphe-like line. *Albumen* horny, opposite the centre of the above line deeply excavated; cavity as usual filled with a spongy substance. *Embryo* opposite the excavation or situated in the centre of the dorsal face.

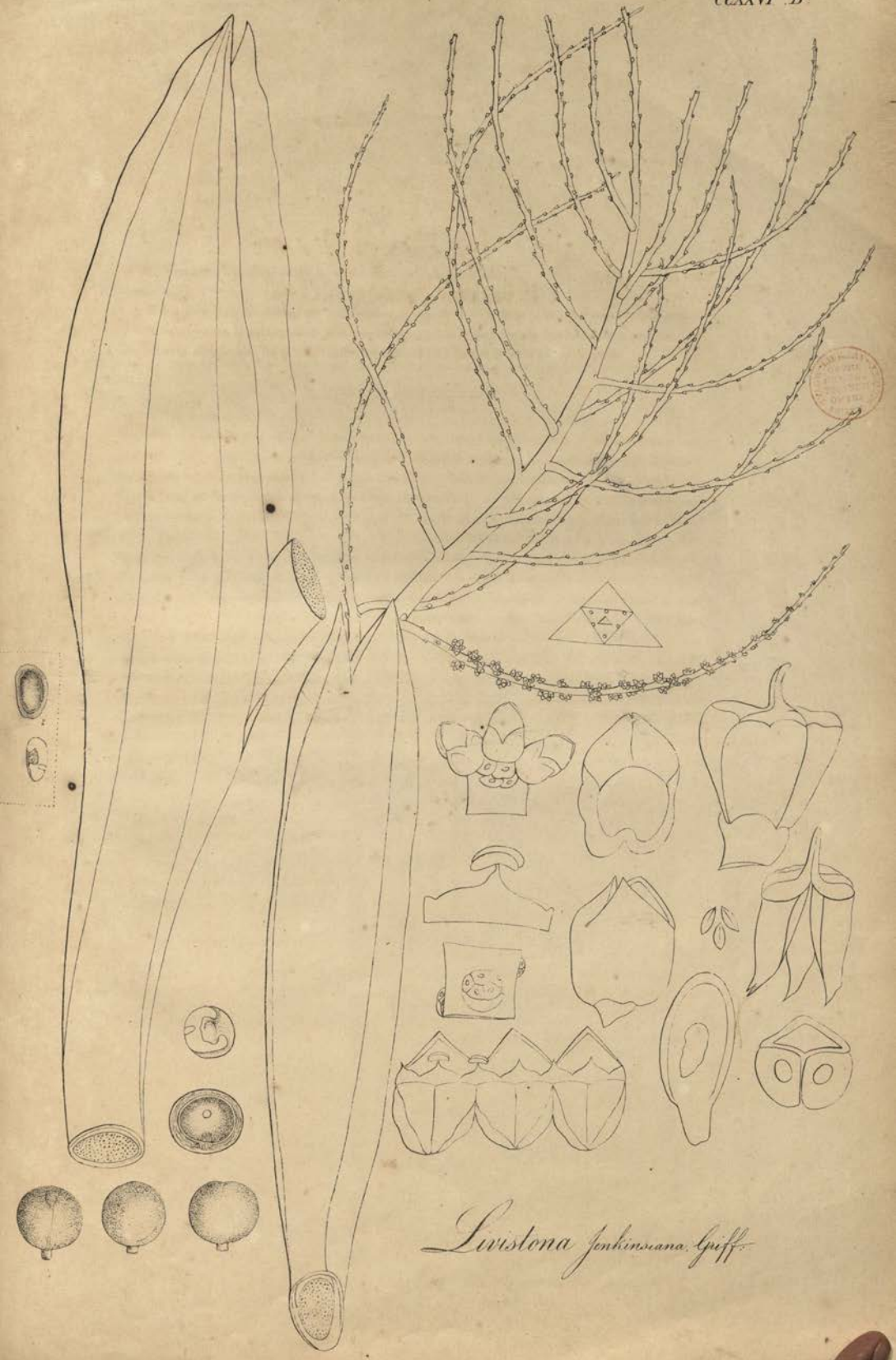
HAB.—Gubro Purbut in Upper Assam, where it was found in flower, March 1836. Common throughout Assam, but most plentiful in the Nowgong district. *Toko Pat* of the Assamese.

OBS.—It appears to be quite distinct from any published species. The fruit is larger than that of any other species.

Major Jenkins tells me: "that this palm is an indispensable accompaniment of every native gentleman's house, but in some parts it is rare, and the trees are then of great value. I cannot call to my recollection having ever seen a Toko tree undoubtedly wild. The leaves are in universal use throughout Assam for covering the tops of doolees, (palanqueens), and the roofs of boats, also for making the peculiar hats, or rather umbrella-hats *(jhapees)*



Livistona Jenkinsiana Griff.



Livistona Jenkinsiana Griff.

of the Assamese. For all these purposes the leaves are admirably adapted from their lightness, toughness, and durability,"

It has been therefore deemed not inappropriate to connect with it the name of the present Commissioner of Assam, whose name is so honourably and inseparably connected with that of the Province under his control. To his constant contributions the Botanic gardens are indebted for a number of seeds and young plants.

2. LIVISTONA SPECTABILIS.

TAB. CCXXVI. C.

Procera, petiolis per totam longitudinem armatis, foliis orbiculari-peltatis diametro extremo 9-10-pedali, segmentis circiter 90 profunde bipartitis, laciniis in filis longis-pendulis acuminatissimis, calyce ad medium tripartito, baccis subrotundis globuli sclopeti minoris magnitudine.

This is a lofty palm, fifty or sixty feet high. *Trunk* smooth or armed towards the base with the hard persistent bases of the petioles. *Crown* ample, round. *Petioles* obtusely triangular, armed along the margins with very stout, conical, subulate, compressed, generally recurved thorns. *Lamina* orbicularly peltate, nine or ten feet across, plaited deeply, divided into about ninety divisions. These are ensiform, deeply bilobed, the segments being gradually acuminated into flat pendulous threads. The central divisions reach to two feet from apex of the petiole, while the outer ones reach almost to the petiole itself. The length of their segments $2\frac{1}{4}$ to 3 feet, those of the central divisions extending to about a foot from the base.*

Spadices axillary, four or five feet long, alternately branched, nodding. *Branches* one, or one and half foot long, spreading, dichotomous at the mouths of the spathes, much divided into forked or simple spreading branchlets (spikes), six or ten inches long. *Spathes* coriaceous, fuscous or chesnut coloured, concealing the whole peduncle, with erect adpressed acuminate limbs; the lower ones generally more or less reticulately split.

Flowers sessile, the lower ones several together, the upper solitary. *Calyx* minute, cup-shaped from a broad base, divided to the middle into three round teeth. *Corolla* (in bud) depressed, a little longer than the calyx, divided nearly to the base into three broad segments. *Stamens* six; *filaments* united to the corolla as far as the base of the segments, there (free) short, dilated. *Anthers* oblong-ovate or cordate-ovate. *Ovarium* oblong-obturbinate, sculptured at the apex, the three carpels cohering by the style, which is tri-sulcate, filiform, about three times shorter than the ovarium. *Ovule* solitary, erect, anatropous.

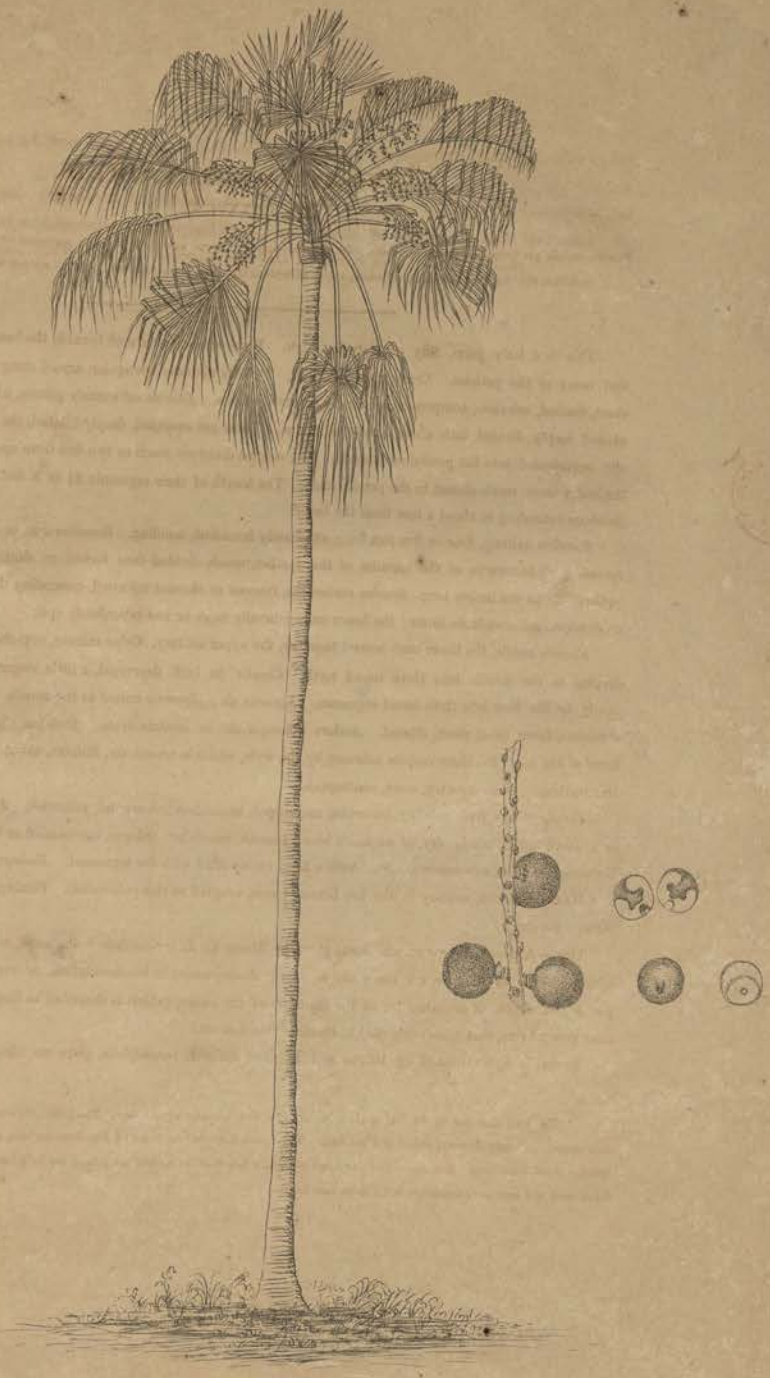
Spadix of the fruit nodding, otherwise unchanged, branchlets sub-secund, yellowish. *Berry* globose, of the size of a small bullet, nearly dry, of an azure blue; smooth, somewhat oblique, surrounded at the base by the perianth. *Endocarp* thickish, sub-osseous. *Seed* with a large cavity filled with the tegument. *Embryo* central.

HAB.—Malacca, solitary in the low littoral tracts, adapted to rice cultivation. Penang. Mr. Lewis. Malayan name. *Sardang*.

OBS.—Although the vernacular name given by Blume for *L. rotundifolia* is the same, and the fruit agrees well with the figure of Martius, yet there are so many discrepancies in his description, as regards the arming of the petiole, the degree of acumination of the segments of the leaves, (which is described as less than in *L. sinensis*), and their general size, that I am compelled to consider this distinct.

Rumph's figure, quoted by Blume and Martius, under *L. rotundifolia*, gives no idea of the habit except as

* The long diameter of the leaf is about 6 feet, the cross diameter about 6 feet. The lateral divisions almost reach to the base, and their secondaries again do the same, about 4 feet long. The intermediate reach to about $1\frac{1}{2}$ foot from the base, are $4\frac{1}{2}$ feet long, the secondary divisions about 3 feet long. The central divisions reach to about 3 feet from the apex of the petiole, are $3\text{-}3\frac{1}{2}$ feet long, their secondary divisions 3 feet long, and even more acuminate and filiform than the rest.



Livistona spectabilis Griff.

Livistona Sinensis

regards the fruit-bearing spadix. And I do not think it probable that the retrofracted pendulous divisions of the leaves, for which this species is more remarkable than perhaps any other, would have escaped Rumphius altogether. F. Bauer's beautiful figure* of *L. inermis* gives, excepting as regards the pendulous segments of the leaves and annulation of the trunk, a good idea of the habit of this palm. I am not aware of its being applied to any use.

3. LIVISTONA SINENSIS.

TAB. CCXXVI. D.

L. sinensis, *Mart. Palm. p.* 240. *t.* 146, 1-11.

20 pedalis, petiolis inermibus, foliorum lamina reniformi-flabelliformi, diametro 5-pedali, segments 80-85 ad medium bipartitis subulato-acuminatissimis pendulis, fructibus sub-olivæformibus inæquilateralibus.

The largest specimen is twenty, or twenty-five feet high, with a stout obscurely annulated trunk. *Crown* round. *Leaves* much plicated, and also conduplicate along the centre, the lateral segments which are much the narrowest are 2 feet, or 2 feet 2 inches long, their divisions are about a foot long. *Spadices* smaller, but otherwise much like those of *L. spectabilis*.

Flowers white, of an unpleasant smell, generally four together. *Calyx* with three rounded teeth having membranous margins. *Corolla* longer than the calyx, divided below the middle into three cordate erect segments. *Fruit-bearing spadix* nodding, with sub-secund branches. *Berries* dull blue, oblong, seven lines long, and four and half wide. *Seed* oblong, of a greyish colour, on a longitudinal section reniform, intrant process sub-central; the *embryo* is situated opposite to this a little below the centre of the dorsal face, looking downwards.

HAB.—Southern China, according to Dr. Martius. It is cultivated in the Hon. Co.'s gardens under the name Livistonia Mauritiana; said to have been introduced from the Mauritius in 1821.

OBS.—This species approaches in the acuminated pendulous segments of the leaves, to *L. spectabilis*, but otherwise it is quite distinct. It is not mentioned in the Hortus Mauritianus. A. D. 1837.

* Mart. Palm, *t.* 145.

X. CHAMÆROPS.

Linn. Muss. Cliff. p. 10. *Gen. Pl. ed. 6ta.* 1764. *p.* 571. *No.* 1219. *ed. Schreb. p.* 772. *No.* 1688. *Jessieu. Gen. p.* 39. *Lam. Enc.* 4. *p.* 709. *(Palmiers) t.* 900. *Syst. Pl. ed. Schultes.* 2. *p.* xciii. 1488. *Endl. Gen. p.* 253. *No.* 1759. *Mart. Progr. p.* 9. *Palm. p.* 247. *t.* 120. 124-5. *Pl. As. Rar.* 3. *t. t.* 211. *Andrews. Bot. Rep. t.* 599. *Bot. Mag. t.* 2152. *Lambt. in Linn. Trans.* 10. *t.* 8. Chamæriphes *Gærtn. Fruct. et. Sem.* 1. *p.* 25. *t.* 9.

GENERIC CHARACTER.

FLOWERS polygamously monœcio-dicœcious. CALYX and COROLLA each three parted. STAMENS 6 to 9, filaments united at the base. OVARIES 3. STYLE none. BERRIES 1 to 3, one-seeded. ALBUMEN hollow in front, smooth, or ruminately variegated. EMBRYO placed behind.

HABIT.—Perennial palms, shrubby, arboreous, either tall or dwarf, often with copious reticulated fibres. PETIOLES with the margins either spinous or smooth. LAMINA palmately many-parted, segments induplicately folded, with two-lobed points, and the intermediate threads often wanting. SPADICES either simply or compoundly branched. SPATHES coriaceous tubulose, branches few or deficient. FLOWERS yellow, bracteate. FILAMENTS united at the base. BERRIES fleshy olive-shaped or somewhat round.

OBS.—This genus is allied to *Livistona*, and presents an affinity to *Phœnix* in the polygamous flowers, the increased number of stamens, the nature of the berries, and the structure of the seed.

1. CHAMÆROPS MARTIANA.

TAB. CCXXVII. A.

C. Martiana, *Mart. in Pl. As. Rar.* 3. *p.* 5. *t.* 211.

Trunco elato, frondium vagina cylindrica reticulata, petiolis margine leviter dentatis et supra paleis albis furfuraceis, lamina reniformi subtus glauca, laciniis 70-75 conduplicato-canaliculatis, segmentis apice bifidis, spathis partialibus pluribus, bacci[illegible] (flavescentibus).

The description of this palm is taken from living plants in the H. C. Botanic Gardens, and that of the inflorescence and fruit is taken chiefly from Dr. Martius, *Palmæ loc. cit.*

Trunk twenty feet high, irregularly annulate, of irregular diameter. *Crown* hæmisphærical, rather thin.

Leaves three feet long. *Petioles* two and half or three feet long, unarmed, generally partly twisted. *Lamina* reniformly orbicular or almost quite orbicular, concave, (rarely convex) two feet two inches long, and about four feet broad; laciniæ about seventy-five in number, conduplicately canaliculate, glaucous underneath, with nodding ends; the broadest ones about sixteen inches long, and obtusely bilobed to the depth of half an inch or an inch; lateral ones about a foot long, linear acuminate, very narrow, acutely bilobed; intermediate ones sixteen inches long, and also acutely bilobed.

Spadices three or five feet long, very much branched; furnished at the base (and under each primary branch) with spathes; peduncle about a foot long. Lowermost *spathe* one, or one and half foot long, two-edged, semi-bifid at the apex: the third or fourth suffults a flower-bearing branch. *Spikes* one, or one and half inch long. *Flowers* minute, solitary, or in pairs: at the base of each is a minute membranaceous bract. *Calyx* trifid; laciniæ ovately triangular, sub-obtuse. *Petals* three times larger than the calyx, ovately orbicular, erectly patent or spreading. *Stamens* as long as the corolla. *Anthers* linear-oblong. *Ovaries* three, ovate, covered with a silky wool: the fertile ones have very short styles terminated by a capitate stigma: the barren ones have longer styles without any stigma. *Berries* shaped like an olive, but twice as small, furrowed slightly along on one side: yellowish, sprinkled with adpressed dry squamules. *Seed* erect, of the size of a coffee seed: ventral face with a depression, filled with cellular substance; dorsal face convex. *Albumen* cartilaginous-horny, horse-shoe-shaped on a transverse section. *Embryo* at the centre of the dorsal face.

HAB.—Bunipa in the valley of Nipal, at an elevation of about five-thousand feet above the level of the sea. Newar name, *Tuggu*.

OBS.—This elegant Palm thrives tolerably well in the H. C. Gardens in shady raised spots.

2. CHAMÆROPS KHASYANA.

TABS. CCXXVII. A.B.C.

Trunco mediocri, petiolis per totam longitudinem denticulato-scabris, fibrillitio e fibris erectis rigidiusculis, lamina reniformi-flabelliformi profunde 60-65 partita, laciniis induplicatis bilobis vel bipartitis lobis centralium brevibus obtusis recurvis, spadice (fructus) bipedali, ramis primariis tribus, spathis subternis (basilaribus 2 rameo 1), pedunculum communum omnino tegentibus, fructibus oblongis livido-cæruleis.

The description of this species is derived from an entire specimen of a trunk and crown, and two fruit-bearing spadices. It is a palm of moderate height, (the specimen measures nine or ten feet), the *trunk* five inches in diameter in the thickest parts, and is obscurely annulate. Under the *crown*, which is thick, is an oblong mass (two feet long) consisting of the flattened bases of petioles, and their *rete* of stiff woody fibres.*

Leaves about three and half feet long. *Petiole* eighteen inches long, with irregular denticulate margins.

Lamina flabelliform, reniform, two feet long by three and a half feet wide: divisions about sixty-five in number, the lateral ones being the shortest, that is to say twelve or fourteen inches long, but they are more deeply divided than the others, down indeed to within five or six inches of the apex of petiole; linear, their segments one and half or two inches long, narrow, acute; central divisions ensiform reaching to within ten or twelve inches of the apex of the petiole, about sixteen inches long, shortly and obtusely bilobed, segments about half an inch long with recurved points; the intermediate divisions are also ensiform, about eighteen inches long, their segments narrower and deeper than those of the central part. Young leaves covered with thick, white, paleaceous tomentum.

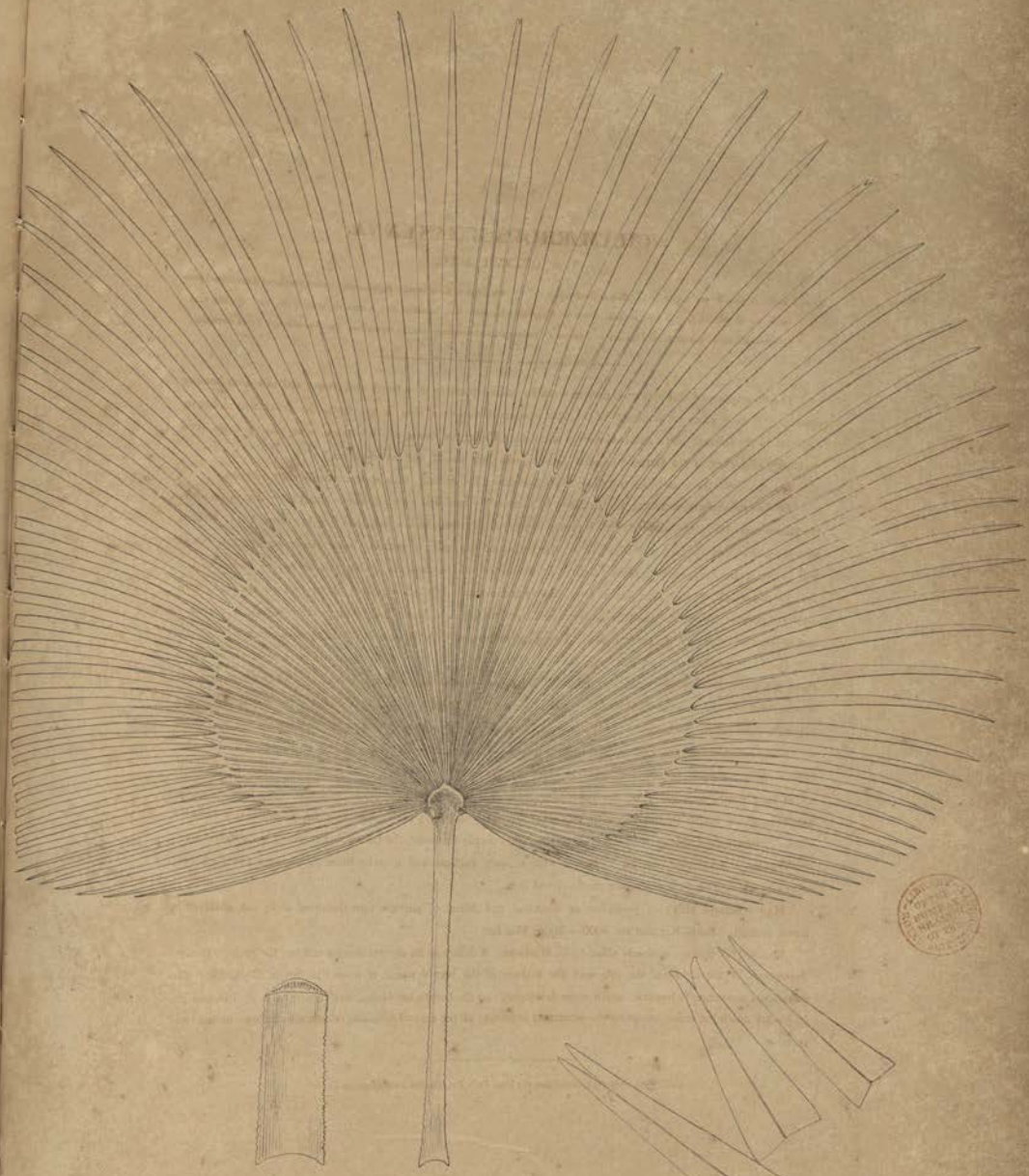
Spadix (fruit-bearing), two feet long, nodding, compressed: the lower half concealed by the *spathes*, of which there are three, two common ones, and the third belonging to one of the main branches. They are coriaceous brown, with oblique mouths and bilobed limbs, the lowest is about a foot long. *Branches* of the spadix quite exserted, quite naked, the terminal one dichotomous: divisions many. *Spikes* four or six inches long.

Fruit scarcely baccate, half an inch long, and two and half lines broad, either solitary or two or three together, but of distinct carpels, oblong, inæquilateral, obliquely apiculate at the apex, surrounded at the base by the *calyx* which has a stout cylindrical base, and three deep, broad oblong divisions, and by a *corolla* of three cordate ovate petals equal in length to the calyx, as well as by six sterile stamens: and on one side may be found two abortive villous ovaries. *Seed* oblong, with the ventral face rather deeply furrowed, the furrow not reaching quite to the apex, reniform on a transverse section. *Albumen* with a scaly surface, and a cavity filled with spongy tissue: horny, otherwise equal, *Embryo* in the centre of the dorsal face.

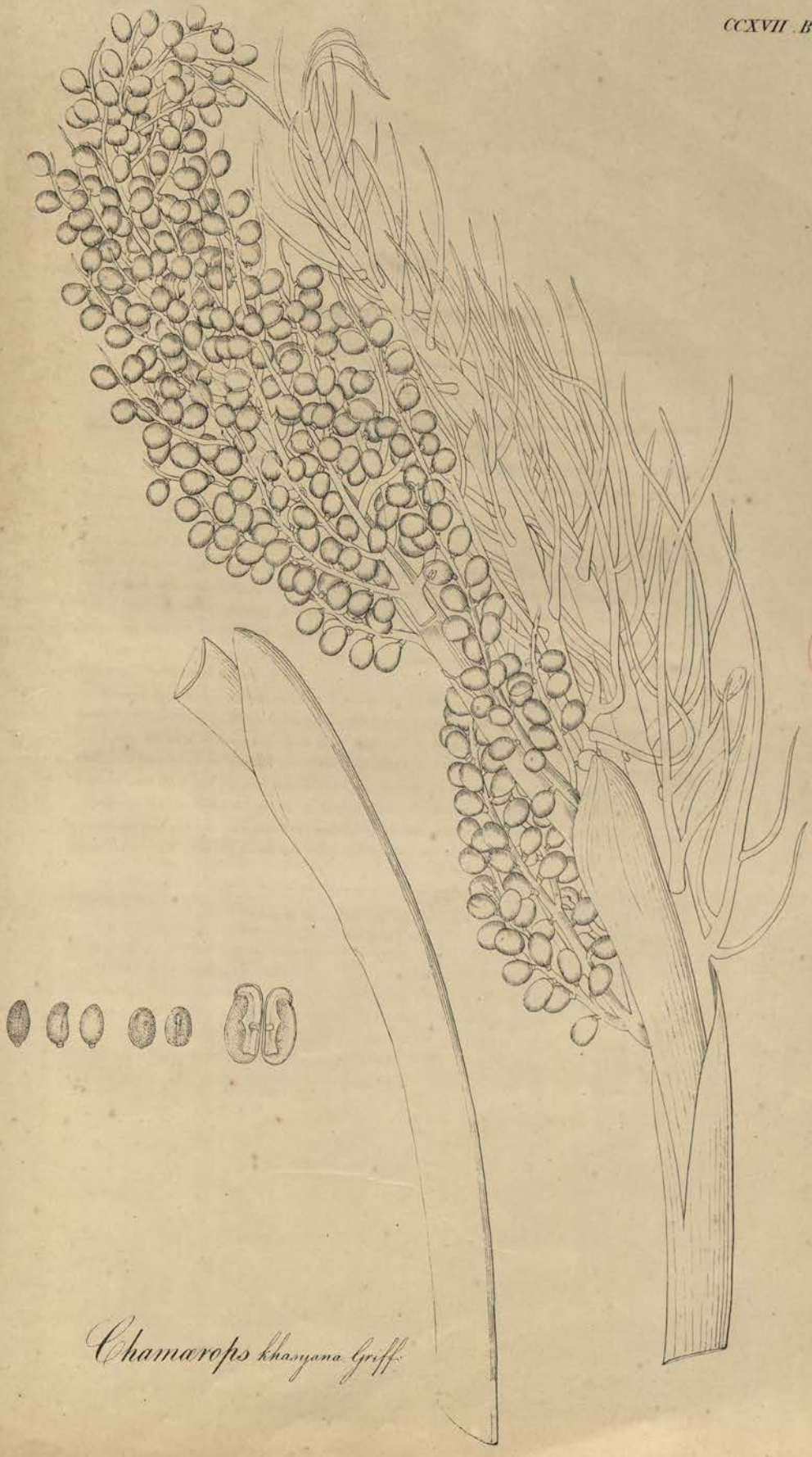
HAB.—Khasya hills: on precipices at Moosmai and Mamloo, altitude four-thousand feet; not observed in flower or fruit. Takill Kemaon alt. 8000.—Major Maddan.

OBS.—This species is closely allied to *C. Martiana*: it differs in its shorter stouter stature, the petioles toothed throughout, in the nature of the rete, and the texture of the leaves which is more like that of *C. humilis*. The paleaceous tomentum is however much more developed, and the berries are bluish, not yellow. The divisions of the leaves are much the same, excepting the secondary segments of the central divisions, which are shallow, obtuse and recurved.

* Seeds recently received into the Hon. Co.'s Bot. Garden have germinated.



Chamærops khasyana Griff.



Chamærops khasyana Griff.

3. CHAMÆROPS RITCHIANA.

Nana, sæpius subacaulis, petiolis inermibus, fibrillitio subnullo, lamina profunde palmatim 10-15 partita, laciniis induplicato-sissimis ultra medium bipartitis, segmentis rigidis angustis gradatim acuminatis.

The description of this species is derived from specimens obtained in Affghanisthan, and a few seeds received from the Seharunpore Garden, of which one germinated in the H. C. Botanic Gardens.

This is a small Palm, scarcely exceeding two or three feet in height, generally tufted, and generally almost stemless. There is scarcely any *rete*, but the bases of the petioles where they naturally cover each other, present a rust-coloured wool.

Leaves from twenty inches to three feet in length, whitish-glaucous coriaceous. *Petiole* six to twelve inches long, quite unarmed. *Lamina* palmate, laciniæ (the fibres stout, often persistent), ten or fifteen induplicate, divided to the middle or a good deal below, into gradually acuminated, rigid, subsequently obtuse segments. The *seeds* seem to vary a good deal, some being oblong, others round, some again as large as a small marble, others not much bigger than a large pea, surface minutely wrinkled. *Raphe* tolerably distinct. *Chalaza* palmately branched. *Albumen* horny, very dense, with a good sized central cavity. *Embryo* situated near the base, narrow at the radicular end.

Hab.—Khybur Pass, and generally in the low arid mountainous parts of Eastern Affghanisthan. Pushtoo name *Maizurry*. Not observed in flower or fruit. Beloochistan & Scinde Hills —

Obs.—It appears to be distinguished from *C. humilis* by its unarmed petioles, the want of *rete*, and by the deeply divided lacinæ of the leaves, which in *C. humilis* are quite entire,* or at the most, only bifid.†

I have named it in honour of my friend Dr. Ritchie of the Bombay Medical Service, to whom I was indebted while in Affghanisthan for constant contributions of plants, and two valuable collections, one made between Candahar and Herat, and the other between Herat and Bamean via Maimunna and Toorkistan, besides another collection made about Pesh-Bolak and in the Khybur Pass. Dr. Ritchie was employed in Affghanisthan for a considerable time, and was more extensively acquainted with that country than any other officer except perhaps Major Pottinger. It is the only palm I met with in that country, and is of extensive use for making cordage, etc.

* Desf. Fl. Atl. 2. p. 437. Syst. Veg. ed. Schult. 2. p. 1489.

† Mart. Palm. p. 248.

XI. PHŒNIX.

Linn. *Gen. n.* 1224. Juss. *Gen.* 38. Gærtn. l. 23. *t.* 9. Roxb. *Corom. t.* 74 *et* 273. Mart. *Palm. t.* 120. 124. 136. 164. Elata ait. *Hort. Kew.* 111-477. Endl. *Gen.* 1763.

GENERIC CHARACTER.

FLOWERS dicœcious on a branching spadix. SPATHES simple and broad at the base. CALYX cup-shaped, 3-toothed. COROLLA 3-petalled. STAMENS 6 or 3. FILAMENTS short or nearly obsolete. ANTHERS linear. OVARY of 3 parts, united when matured. DRUPE one-seeded. SEED with a longitudinal furrow. ALBUMEN reticulated. EMBRYO placed behind.

HABIT.—Palms of the East Indies and northern parts of Africa, trees and shrubs, their STEMS marked with the scars of fallen leaves, or rough with the persistent bases of their petioles: in some cases stemless. The LEAVES are pinnate, the PINNULES linear. The SPADIX appears from between the leaves, the SPATHES coriaceous and sheathing. FLOWERS yellowish white. FRUIT edible soft and reddish yellow or brown.

1. PHŒNIX ACAULIS.

TAB. CCXXVIII.

P. acaulis. *Roxb. Hort. Bengh. p.* 73. *Fl. Ind.* 3. *p.* 783.* *Icones Suppt.* 5. *t.* 15. *Buch. Hamilt. Comment. in Hort. Malab. in Linn. Trans.* 15. *p.* 88. *Sprengel. Syst. Pl.* 2. *p.* 139.

Trunco brevissimo bulbiformi, foliis fasciculatis linearibus conduplicatis sub-quadrifariis, spadicibus faomineis terra semi-immersis et in spathis e maxima parte inclusis, fructibus oblongis, embryone in centrum dorsi.

"*Stem* none in plants ten years old; at this age when in flower, the whole body of the plant, including the inflorescence, but exclusively of the foliage is of an ovate form, and not exceeding six or eight inches in height from the surface of the ground. *Leaflets* (*Fronds*, L.) pinnate; from two to six feet long.

Leaves nearly opposite, rather remote fascicles; the superior ones folded, slender, ensiform, and about eighteen inches long; lower ones small, straight, rigid, and ending in very sharp spinous points. *Petioles* (*stipes*) near the base flat, towards the apex triangular, smooth.

MALE. *Spathes* and *spadix* as in the female hereafter described. *Flowers* alternate, solitary, sessile, small pale yellow. *Calyx* one-leaved, triangular; *angles* or *lobes* acute, unequal. *Corolla* three petalled; *petals* obliquely-lanceolate, acute, slightly united at the base. *Filaments* six, very short, inserted into the base of the corolla. *Anthers*, linear, nearly as long as the petals. *Pistil* none.

FEMALE. *Spathes* universal, axillary, solitary, one-valved, about six inches long, with their base rather below the surface of the earth, generally splitting into two portions down the middle on each side. *Spadix* ramous, composed of many simple short erect flexuose branches; all are smooth, and of a pale yellow. *Flowers* alternate, solitary, sessile, in bractiform notches on the sides of the branches of the spadix. *Calyx* cup-shaped, truncate, with three obscure points at equal distances on the margin. *Petals* three, sub-rotund, thick and fleshy, concave, smooth. *Nectary* a small, six-toothed cup in which the germs sit. *Germs* three, each one-celled, and containing a single ovulum attached to the middle of the cell on the inside. *Styles* three, recurved, small and short. *Stigma* small. *Drupe* oval, fleshy, small, smooth, of a bright red, of the size of a very small olive, one-celled. *Seed* solitary, oblong, with a deep longitudinal groove on one side. *Embryo* in the middle of the back, or convex side of the seed." *Roxb. o. c. l. c.*

HAB.—Behar, *(Roxb.)*. Elevated plains on the north side of the Ganges on a clayey soil. *Buchanan Hamilton.* Chota Nagpore. Burmah in plains between the valley of Hook-hoong and Mogam. *Junglee Khujur.*

OBS.—This species varies considerably in the size of the leaves and breadth of the pinnules, and in the size as well as degree of exsertion of the male spadix. The male plant is probably scarcely distinguishable from that of the succeeding, but the female is at once distinguished by the shortness of the peduncle of the spadix, which is generally shorter, and never, so far as I know, longer than the spathes.

Dr. Royle† mentions a species closely allied to, if not identical with this, inhabiting the Kheree Pass, Siwalik Hills, at an elevation of two-thousand-five-hundred feet, in company with Pinus longifolia. I omit his name, because

* Buchanan is here given as the authority, but this appears to be a mistake, see Linn. Trans., xv. p. 85.

† Illustr. p. 394, 397.

it is not accompanied with any defining characters. Most probably it is the succeeding or a third species of this form, which requires much more examination than it has received.

I subjoin the description of a specimen sent by Colonel Ouseley, who informs me that it is considered by the natives as a distinct species. The only differences I can detect are the shortness and less induplication of the pinnules, and the colour of the fruit.

P. acaulis var. melanocarpa.

A dwarf palm not exceeding two feet in height, including the leaves. *Stem* bulbiform, six inches long, covered with the protuberant hardened persistent bases of the petioles, their points being spreading recurved. *Leaves* one, or one-and-half foot long, ascending, then spreading. *Petiole* below flat, above quite compressed. *Pinnules* subfasciculate, fascicles subopposite, some ascending on either side, others spreading, attached by broad cartilaginous insertions above which they are conduplicate, glaucescent, spinous pointed, the upper ones the largest, seven or eight inches long, half an inch broad, conduplicate near the base, above this almost flat (at least the old ones); the lowermost are degenerated into strongish channelled three-gonal spines, the rest present intermediate characters.

Spadices of both sexes buried among the persistent bases of the petioles, of the fruit only partly exserted, without spathes; *spikes* two or three inches long, stout. *Fruit* suffulted by a green angular bract, sessile, alternate, of the size of a small olive, at first reddish, afterwards black-purple: apex distinctly cuspidate, base surrounded by an angular tridentate calyx, by the imbricated broad petals, and by six small abortive stamens. *Endocarp ?* (tegument ?) thin, like silver paper. *Seed* one, erect, greyish, deeply furrowed on one side, and with about seven striæ on the remaining part of the surface. Along the same furrow the horny *albumen* is deeply grooved, the groove filled with spongy substance. *Embryo* at or a little below the centre of the dorsal face.

2. PHŒNIX OUSELEYANA.

Trunco brevissimo bulbiformi, foliis fasciculatis linearibus conduplicatissimis angustissimis, spadicibus fœminis longe exsertis spathis multoties longioribus.

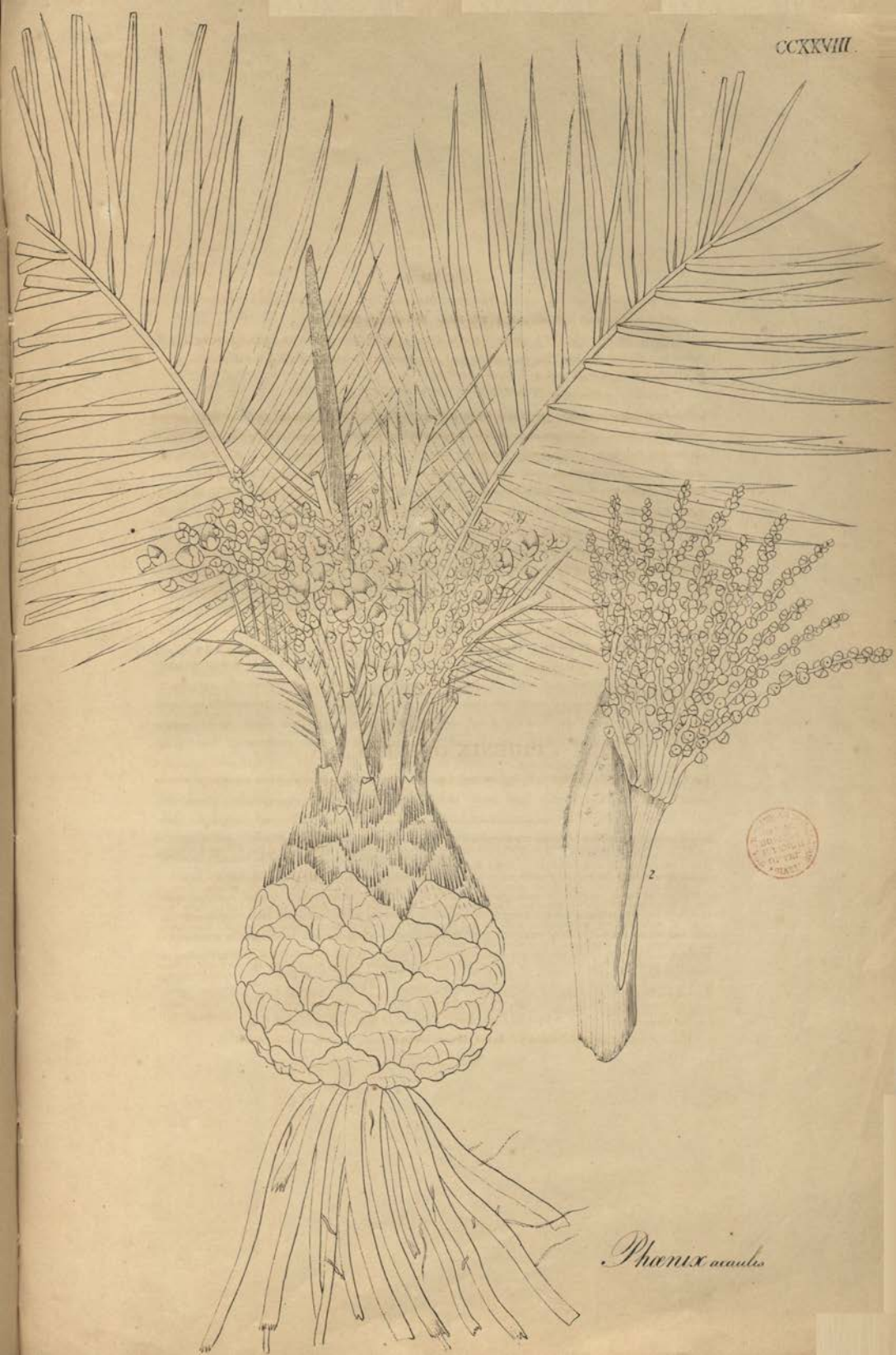
The description of this species is taken from specimens of male and female plants entire, but without flowers or perfect female spathes, communicated by Major Jenkins.

Bulbous *stems* ovate, imbricated conspicuously with the hardened scale-like bases of the petioles, about a foot in length and six inches in diameter. The *rete* consists of a few rigid fibres. *Leaves* two and a half or three feet long. *Pinnules* entirely conduplicate, about a foot long, from the conduplication two, or two and half lines broad, subulate-acuminate; lowermost degenerated into short spines.

Male *spadices* about a foot long, the ends of the uppermost *spikes* rather longer than the bivalved carinate *spathe.*

Female *spadices* two, or two and half feet long with a few short flexuose spikes towards the apex, much longer than the spathes, which appear to be about a span long. *Peduncles* of both spadices much flattened.

Hab.—Chota Nagpore, *Col. Ouseley.* Assam, *Major Jenkins.*



Phœnix acaulis

3. PHŒNIX PEDUNCULATA.

Monoica, sobolifera, plerumque acaulis, pinnis fasciculatis conduplicatissimis linearibus acutis spadicibus foliorum longitudine, fœmineis cito elongatis, fructus 3-4 pedalibus fructibus oblongis, embryone versus medium faciei dorsalis.

The description of this species is derived from complete specimens of young leaves, male and female spadices in flower, and fruit as well as the letters of Dr. Wight.

Monœcious, soboliferous, generally stemless. *Trunk*, if any, rough.

Leaves four or five feet long. *Rete* scanty. *Petiole* compressed in its lower eighteen inches or two feet, bearing marginal, rather long, solitary or fasciculate spines, which are degenerated pinnules. *Pinnules* fasciculate, quite conduplicate, about a foot long, acute, striately veined, two, or two and-a-half lines long, those next the spines are much the narrowest.

Male *spadices* about a span long. *Peduncle* compressed, branched above the middle. *Spathe* rather shorter, flat-navicular paleaceous carinate. *Branches* in flat fascicles, altogether nearly pennicillate, angular, fluxuose, two to four inches long. *Flowers* solitary at the flexures, angular. *Calyx* small cup-shaped with three short teeth. *Petals* oblong, oblique, of the usual hard husky texture, striate, obtuse, three times longer than the calyx. *Stamens* six, filaments very short; anthers linear-oblong, shortly mucronate.

Female *spadix* in flower a little larger than the male, scarcely exceeding the spathe. *Branches* inserted in flat fascicles, forming a more pennicillate bunch than the male, flexuose, less angular, and three or four inches longer. *Flowers* generally solitary at the flexures, sometimes with a tendency to be in pairs, roundish, small. *Calyx* broad, cup-shaped, three-toothed. *Petals* orbicular, convolutely imbricate; about twice as long as the calyx. *Rudimentary stamens* none? *Ovaria* three, nearly distinct, convexly bifacial interiorly. *Styles* three, recurved, stigmatose along inner faces. *Ovula* solitary erect. *Fruit-spadix* three or four feet long, the compressed *peduncle* having become exceedingly elongated.

Spikes much the same, apparently dull reddish. *Fruit* sub-distichous, oblong, about six lines long and three wide, red, shortly apiculate; pulp scanty, farinaceous, sweet. *Seed* oblong, deeply furrowed. *Albumen* horny. *Embryo* about the centre of the ventral face.

Hab.—Common and very gregarious on open ground of the hilly country about Courtallum, Coonoor, Nilgherries at an elevation of 6000 feet of the above the Sea—*Wight*,

Obs.—This appears to be allied to *P. Ouseleyana*, differing in the larger stature, the shorter, less acuminate pinnules, and the exceedingly long peduncles of the fruit. The elongation appears to commence before the ovaria have commenced to enlarge. *P. farinifera* is at once distinguishable from it by the opposite pinnules.

Imperfect specimens of this were probably communicated many years ago to Dr. Martius, under the name P. pedunculata.

4. PHŒNIX FARINIFERA.

P. farinifera, *Willd. Roxb. Cor. Pl.* 1. *p.* 55. *t.* 74. *Icones.* 15. *t.* 32. (inflor.) *Fl. ind.* 3. *p.* 785. *Sprengel Syst. Pl.* 2. *p.* 139. P. pussilla. *Lour. Fl. Coch. ed. Willd. p.* 753. *Gært. Sem. et. Fruct* 1. *t.* 9. ?*

Dicœcious. Trunco brevissimo, pinnis oppositis, spadicibus exsertis, fructibus oblongo-ovatis, embryone ad medium faciei dorsalis.†

"*Trunk;* the little it has is only about one, or at most two feet high, and so entirely enveloped in the sheaths of the leaves that it is never seen, the whole appearing like a large round bush.

Leaflets pinnate. *Leaves* opposite, sword-shaped, much pointed, smooth, of a deep green. *Spathes* axillary, one-valved, concave on the inside, this concavity is bordered by two sharp edges; convex on the outside, there splitting longitudinally, leathery, smooth, withering.

Spadix erect, very ramous, branches simple, spreading in every direction, from eight to twelve inches long.

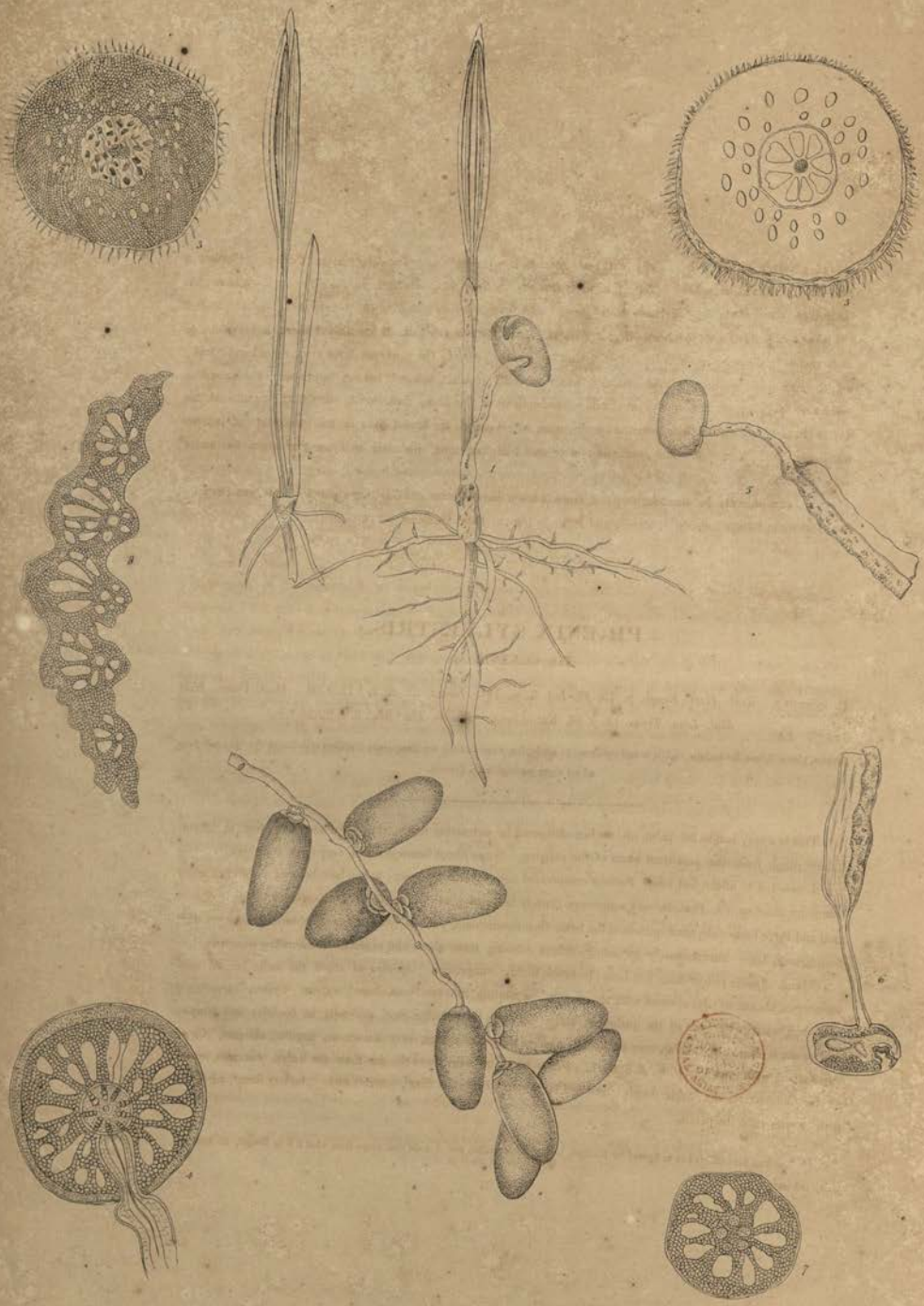
Male Flowers. *Calyx* small, slightly three-toothed. *Petals* three, oblong, white, rigid. *Filaments* six, very short, inserted into a fleshy globular receptacle. *Anthers* oblong, erect.

Female Flowers on a separate plant. *Calyx* as above. *Petals* three, orbicular, concave, equal, rigid, lasting. *Germs* three, though never more than one increases in size, the other two always wither, although they contain the rudiment of a seed every way like the fertile germ; ovate, each ending in a short recurved style. *Stigma* simple. *Berry* when ripe, of a shining black, of the size of a large French bean; the *pulp* is sweet and mealy, but in small quantity, the natives eat them as gathered from the bush without any preparation. *Seed* cartilaginous, of the shape of the berry, grooved longitudinally, as in the common date, pretty smooth, brown on the outside, of a light greyish white within, on the middle of the back there is a small elevation, under which is an oblong pit containing the embryo or first principle of the new plant."

The leaflets are wrought into mats for sleeping upon, &c. The common petioles are split into three or four and used to make common baskets of various kinds, but they are not so good for this purpose as the Bamboo, which is very elastic, much more durable, and splits easily. The small trunk when divested of its leaves, and the strong brown fibrous web that surrounds it at their insertions, is generally about fifteen or eighteen inches long, and six in diameter at the thickest part; the exterior or woody part consists of white fibres matted together, these envelope a large quantity of farinaceous substance, which the natives use for food in times of scarcity. To procure this meal, the small trunk is split into six or eight pieces, dried, and beat in wooden mortars till the farinaceous part is detached from the fibres; it is then sifted to separate them, the meal is then fit for use. The only further preparation it undergoes, is the boiling it into a thick gruel, or as it is called in India, *Kanji;* it seems to possess less nourishment than the common sago, and is less palatable, being considerably bitter when boiled; probably a little care in the preparation, and varying the mode, might improve it; however, it certainly deserves attention, for during the end of the last, and beginning of this year, and again at this present time, May 1782, it saved many lives. Rice was too dear, and at times not to be had, which forced many of the poor to have recourse to this sort of food. Fortunately it is one of the most common plants on this part of the coast, particularly near the sea."—*Roxb. o. c. l. c.*

* This synonyme is I think doubtful, as Roxburgh's figure does not agree with figs. f. g. of Gærtner.

† Char. e Roxb.



Phœnix sylvestris

HAB.—Dry barren parts chiefly of the sandy lands at a small distance from the sea near Coringa. Flowers in Jan. Feb.; fruit ripens in May. Telinga name *Chilta-eita. (Roxb.)* Common on all the hilly country between the Ganges and Cape Comorin *(Buchanan Hamilton).*

OBS.—There is a male specimen called P. farinifera in the Botanic Gardens. It has a *trunk* four feet high, six or eight inches in diameter, rough with the persistent bases of the *petioles*. The *leaves* are three or four feet long, spreading, the *pinnules* in subopposite fascicles, (the lower generally in pairs), sub-four farious, (upper series sub-ascending lower very spreading, but obliquely) canaliculate, conduplicate at the base, glaucescent, subulately acuminated ten inches long, six lines wide, those next the spinous ones, which occupy the lowest eight or ten inches of the petiole, are longest and narrowest. The *spadix* is one or one half foot long, peduncle well exserted from the axilla and compressed.

This can scarcely be Roxburgh's plant, since it has a distinct stem and fasciculate pinnules. It seems exactly intermediate in foliage between *P. acaulis* and *P. dactylifera* of these Gardens.

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5. PHŒNIX SYLVESTRIS.

TAB. CCXXVIII.A.

P. sylvestris. *Roxb. Hort. Bengh. p.* 73. *Fl. Ind.* 3. *p.* 787. *Icones.* (fl. et. fr.) 15. *t.* 31. *Ham. Comm. Hort Mal. Linn. Trans.* 15. *p.* 86. Katou-indel. *Rheede. Hort Mal.* 3. *t.* 22-25.*

Arborea, pinnis densis fasciculatis rigidis lineari-ensiformibus conduplicato-canaliculatis acuminatissimis, fructibus cylindraceo-oblongis, embryone ad vel supra centrum faciei dorsalis.

This is a very handsome palm, often when uninjured by extracting toddy, thirty-five to fourty feet in height. *Trunk* rough from the persistent bases of the petioles. *Crown* about hemisphærical, very large and thick.

Leaves ten to fifteen feet long. *Petioles* compressed only towards the apex; at the base bearing a few channelled triangular short spines. *Pinnules* very numerous, densely fascicled, glaucous, rigid, ensiform, eighteen inches long, one inch and three lines wide, conduplicate at the base, then canaliculate, subulately acuminated, almost spinous pointed, four farious, some intermediately spreading, others crossing these above and below in an ascending direction.

MALE. *Spadix* two or three feet long; peduncle highly compressed. *Spathes* of about the same length, very coriaceous, almost woody, covered with brown scurf, separating into two boat-shaped valves. *Spikes*, exceedingly numerous towards the apex of the peduncle, and chiefly on its anterior face, generally in fascicles and simple, four or six inches long, slender, very flexuose. *Flowers* three lines long, very numerous, angular, oblique. *Calyx* cup-shaped, with three short rounded teeth. *Petals* three or four times longer than the calyx, concave, warty on the outside, on the inside deeply riged and furrowed. *Filaments* (free), scarcely any. *Anthers* linear, adnate, a little shorter than the petals.

* The fruit here referred to as figured by RHEEDE, is very much smaller, and of a different shape from what it is in Bengal, at least on uninjured trees.

FEMALE. *Spadix* much the same as in the male, as are also the spathes. *Spikes* inserted in distinct groups, one, or one and-a-half foot long, not bearing flowers throughout the lower four or six inches, flexuose. *Flowers* distant, roundish. *Calyx* cup-shaped, obsoletely three-toothed. *Petals* three, very broad, convolutely imbricate, leaving a small opening at the apex. *Barren stamens* three or four. *Ovaries*, three; *ovules* solitary. *Style* recurved, inwardly papillose.

Spadix of the fruit three-feet long, nodding at the apex from the weight of the fruit, much compressed, of a golden orange colour. *Fruit* scattered on long pendulous nodding similarly coloured spikes, with brown orange swollen bases, oblong, very obtuse, fourteen inches long, seven or eight lines wide, with an oblique mark of the base of the style, surrounded at the base by the perianth. *Pulp* yellow, moderate, very astringent, lined by irregular cellular white tissue, part of this adheres to the thin envelope that separates with the seed. *Seed* oblong, deeply grooved (margins of the groove slightly wrinkled) along its whole length on one side, on the other side it has a slight incomplete furrow, in the centre of which is a depression with a mammillate fundus, marking the situation of the embryo. *Albumen* on a transverse section horse-shoe-shaped. *Embryo* at, or a little above the middle of the dorsal face.

HAB.—Common all over India, all soils and situations seeming to suit equally well.* It flowers at the beginning of the hot season, (Roxb.). The most common Palm of India. (Buchanan Hamilton). Beng. *Khujjoor;* Sansc. *Khurjura;* Teling. *Peddaeita.*

OBS.—My materials do not enable me to point out any distinction between this and *P. dactylifera*, the true Date Palm.† In appearance they would seem to be indistinguishable. Roxburgh says nothing in the Flora Indica regarding this in explication of his specific character. But in a pencil note to the unfinished drawing of *P. sylvestris*, he says the male flowers of *P. dactylifera* are most exactly like. Buchanan Hamilton considers it the wild state of the true Date Palm so much cultivated in Arabia and Africa, and states, that on comparing young plants, he had not been able to see the smallest difference, except that the Arabian plant was rather the largest and more vigorous.‡ Compared with Gærtner's figure of *P. dactylifera*, 1, t. 9. the fruit of *P. sylvestris* is considerably smaller. The embryo also is on the central line. I have only seen Martius' character of *P. dactylifera*, (loc. cit.)

"This tree yields *Tari*, or Palm wine during the cold season. The method of extracting it destroys the appearance and fertility of the tree. The fruit of those that have been cut for drawing off the juice, being very small.

"The mode of extracting this juice is by removing the lower leaves and their sheaths, and cutting a notch into the pith of the tree near the top, from thence it issues and is conducted by a small channel made of a bit of the

* This is hardly correct as it appears to me to be confined chiefly to the lower plains. It begins to disappear about 30 miles North West of Burdwan and is scarcely seen in the hilly districts of Behar, where almost the only palms met with are *Phœnix acaulis*, and *Borassus flabelliformis*. ED.

† The plant called Phœnix dactylifera of these Gardens does not attain a greater height than 4-5 feet. *Trunk* remarkably stout, 1 foot or more in diameter, marked with the scars of the petioles. *Leaves* 7-8 feet long. *Petioles* compressed a long way down, in the lower 2 feet bearing many stout rigid channelled spines. *Pinnæ* fascicled, their direction as in *P. sylvestris*, but in a less marked degree, bifarious when young, 1 foot long, 1 inch broad, subulato-acuminate, those next the spines longest and narrowest.

Spadix 2-2½ feet long, branched at the apex; *peduncle* 12 to 18 inches long, much compressed.

This plant is evidently closely allied to *P. sylvestris*, and with *P. farinifera* of the Gardens, forms a complete transition from *P. sylvestris* to *P. acaulis*. Both it and this so-called *P. farinifera* require more examination.

‡ Comm. in Hort. Mal. op. cit. p. 82, 83, 85.

Palmyra tree leaf, into a pot suspended to receive it. On the coast of Coromandel this Palm juice is either drunk fresh from the tree, or boiled down into sugar, or fermented for distillation, when it gives out a large portion of ardent spirit commonly called *Paria aruk* on the coast of Coromandel. Mats and baskets are made of the leaves.

"The Bengalees call this tree *Khujjoor*. They also boil the juice into sugar. In the whole Province of Bengal about fifteen thousand maunds, or about a hundred thousand hundred-weight, is made annually. At the age of from seven or ten years, when the trunk of the trees will be about four feet high, they begin to yield juice, and continue productive for twenty or twenty-five years. It is extracted during the cold months of November, December, January, and February; during which period, each tree is reckoned to yield from one hundred and twenty, to two hundred and forty pints of juice, which averages one hundred and eighty pints; every twelve pints or pounds is boiled down to one of *Goor* or *Jaguri*, and four of *Goor* yield one of good powder sugar, so that the average produce of each tree is about seven or eight pounds of sugar annually.

"Another statement presented to me, gives a much larger produce, viz. the average produce of each tree is sixteen pints per day, four of which will yield two pounds of molasses, and forty of molasses will yield twenty-five pounds of brown sugar. The difference is so great, that I cannot well reconcile them, but am inclined to give most credit to the first.

"Date sugar, as it is here called, is not so much esteemed as cane sugar, and sells for about one fourth less." *Roxb. o. c. l. c.*

6. PHŒNIX PALUDOSA.

TABS. CCXXIX. A.B.

P. paludosa, *Roxb. Hort. Bengh. p.* 73. *Fl. Ind.* 3. *p.* 789. *Icones.* 15. *t.* 33, (indifferent).

Arbuscula, trunco basi annulato, pinnis solitariis bifariis ensiformibus acuminatissimis patenti-nutantibus, spathis antice aperientibus exsertis, fructibus ovatis, embryone hilum versus.

The specimens of this palm growing in the Botanic Gardens form very elegant impenetrable tufts. *Trunk* twelve or fifteen feet high, three and a half inches in diameter, annulate at the base, otherwise covered with the brown, retiferous, armed petioles.

Leaves gracefully spreading, eight or ten feet long. *Petiole* covered with scurf, brownish-glaucescent, in the lower three feet bearing irregularly spreading, hard, brown, triangular, channelled, rather long spines.

Pinnules bifarious, solitary, spreading, then curved downwards, not rigid, two feet long, eight lines wide, exceedingly acuminate, bifarious, conduplicate at the base, otherwise flat, underneath glaucous-cæsious, the lowest being both the longest and the narrowest.

MALE *spadix* about a foot long. *Spathes* coriaceous, bicarinate, opening anticously, orange brownish; keels with irregular edges, *flowers* yellow, more distant than in the other species. *Calyx* cup-shaped, less regularly three-toothed than in *P. sylvestris* or *farinifera*. *Petals* three. *Filaments* six, short.

FEMALE *spadix* about one and half foot long, flowers greenish. *Calyx* as in the male. *Petals* roundish, concave. Sterile *stamens* six. *Ovaries* three, styles recurved, longer than in the other species.

Spadix of the fruit three or four feet long, erect, yellowish orange, branched at the apex. *Spikes* of the same colour, generally several together, with cartilaginous thickened bases, about a foot long, nodding, rarely branched.

Fruit sessile, on thickened knobs, spreading or pointing downwards, first yellowish, then red, lastly black-purple, oval, six or seven lines long, three or four wide, with a small oblique apiculus at the apex; at the base, the more or less split perianth.

Seed ovate, compressed, with a rather deep furrow on one side, ceasing just above the middle, and with an indistinct furrow on the opposite side. Groove of the *albumen* deeper at either end than in the middle. *Embryo* placed near the base.

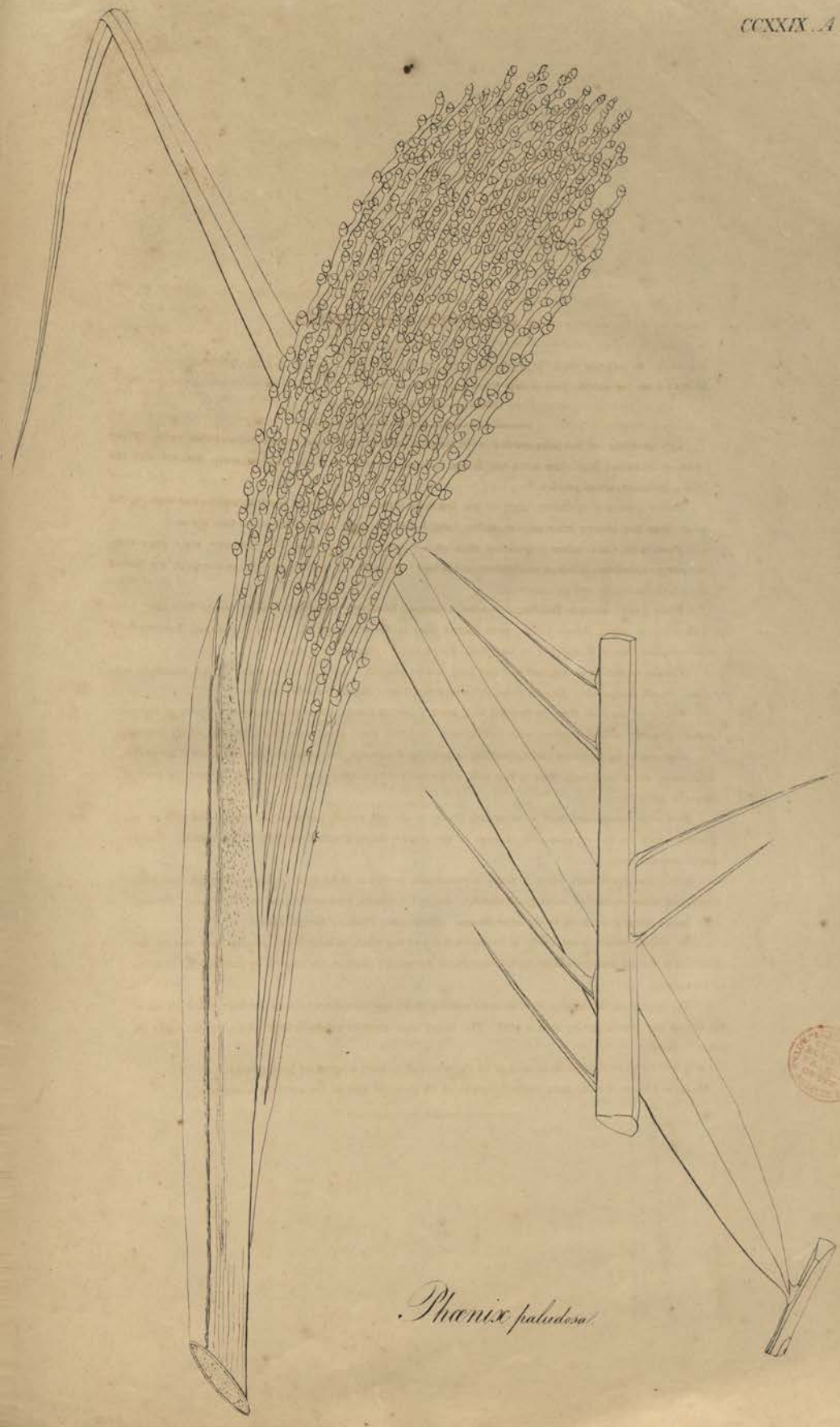
HAB.—The Sunderbuns, where it forms a considerable portion of those impenetrable woods which completely cover that extensive tract of country, *(Roxburgh)*. Along the Saluen, between Amherst and Moulmein. Penang, *(Mr. Lewis)*, where it is known by the name *Dangsa*. Sansc. name *Hintala;* Bengal, *Hintal*.

OBS.—This species is not likely to be confounded with any other, its habit is less genuine than that of the others. It is at once distinguished by the bifarious flaccid flat solitary pinnules, the shape of its fruit and the situation of the embryo.

"The trunks of the smaller trees serve for walking sticks, and the natives have an idea that snakes get out of the way of any person having such a staff. The longer ones serve for rafters to their houses, and the leaves for thatch." *Roxb.*

It is well worth cultivation on account of its elegance, and its being adapted for bank scenery.

So far as I know, it is the most southerly species of the genus, at least of the northern hemisphere.



Phœnix paludosa

Phœnix paludosa

XII. ARECA.

Linn. Gen. p. 516. *No.* 1225. (partim.) *ed. Spreng. p.* 284. *No.* 1473. *Juss. Gen. p.* 38. *Gærtn.* 1. *p. t.* 7. *Lam. Ill. t.* 895. *Roxb. Icones.* 14. *t.* 75-77 *Suppl.* 5. *t.* 64-65. *Corom. Pl. t.* 75. (ex Endl.) *Fl. Indica* 3. *p.* 615. *Mart. Palmæ* 169. *t.* 102, 149, 158. *f.* 4, 5. (ex Endl.) *Endl. Gen. p.* 247. *No.* 1728.

GENERIC CHARACTER.

SPATHE 1 or 2 complete. FLOWERS monœcious in the same spadix, one feminine between two masculine. STAMENS 3, or indefinite. OVARY 1 to 3-celled. OVULA 1. FRUIT drupa ceous or somewhat like a berry, sometimes oblique, one-seeded. ALBUMEN ruminated. EMBRYO near the base.

HABIT.—Arboreal trees or shrubs, often unarmed. TRUNK ringed. LEAVES pinnately divided, seldom twice divided or bipinnate. SHEATH coriaceous, striated. SPADIX axillary paniculate or racemosely divided, rarely simple, often broken. FLOWERS often distichous or ranged in two rows, with a centrifugal expansion or evolution. ANTHERS linear. FRUIT either drupes or berries, the former ovate often orange, the latter globose and of bluish colour.

The genus is subdivided into the following three sections.

SECT. I. PINANGA.

SPATHES 2 complete, seldom 1. SPADIX erect paniculately branching. FLOWERS on the lower part of the spadix 1 feminine between two masculine; on the upper part, masculine in pairs. STAMENS 3 or 12, but often 6. FRUIT. Drupaceous.

HABIT.—Unarmed often arboreous palms, or shrubs sometimes with creeping stems. LEAVES pinnately divided, rarely pinnate. Spadix with the dorsal branches deficient. Feminine flower with the inner leaflets of the PERIANTH longer than the outer.

Of this section the following species are described.

1. *Areca catechu* Wild.
2. ,, *triandra* Roxb.
3. ,, *laxa* Buch.
4. ,, *nagensis* Griffith.

SECT. II. ANACLASMUS.

SPATHE 1 complete. SPADIX broken, 2 to 5-branched, sometimes simple. FLOWERS, one feminine between two masculine. STIGMA discoid, often lobed. FRUIT Drupaceous.

HABIT.—Unarmed shrubs. LEAVES pinnate, feminine flowers with the 3 inner leaflets shorter than the outer.

The species of this section are as follows.

5. *Areca pumila* Mart.
6. ,, *malaiana* Griff.
7. ,, *Dicksoni* Roxb.
8. ,, *gracilis* id.
9. ,, *disticha* id.
10. ,, paradoxa id.

SECT. III. EUOPLUS.

SPATHES 2 complete. SPADIX racemosely divided, branches indefinite, fastigiate, tail-shaped, pendulous. FLOWERS often one feminine between two masculine. FRUIT somewhat of a berry, obliquely shaped and of blue colour.

HABIT.—Arboreous and shrubby, with creeping stems, armed. LEAVES pinnate.

The species of this section are as follows.

10. *Areca tigillaria* Jack.
11. ,, *horrida* Griff.

1. ARECA CATECHU.

Areca Catechu, *Willd. Sp. Pl.* 4. *p.* 524. *Roxb. Cor. Pl.* 1. *No.* 74. *Fl. Indica* 3. *p.* 615. *Icones* 14. *t.* 75. (incompl.) Areca Faufel. *Gært. fr. et. sem.* 1. *p.* 19. *t.* 7. *f.* 2. Pinanga. *Rumph. Hb. Amb.* 1. *t.* 4. Caunga. *Rheede Hort. Mal.* 1. *t.* 5-8.

Arborea, foliis pinnatis et pinnatim fissis, pinnis lineari-ensiformibus vel linearibus oblique acuminatis, spathis 2 fl. masculis solitariis distichis, petalis oblongis acutis, staminibus 6, fl. fœmineis solitariis ad vel versus basin ramulorum, drupa ovata mammillata magnitudine ovi gallinulæ.

This is perhaps the most elegant Indian Palm. It is too well known to need a detailed description. The male flowers are delightfully fragrant.

The trunk grows remarkably straight, often from forty to fifty feet high, and in general about twenty inches in circumference, equally thick in every part, and smooth, but the tree is so well known, and fully described, that I should not have thought of mentioning it, had I not found that its family character was imperfectly known.

"*Male* and *Female flowers* are in the same spadix. *Spathe* double. *Spadix* very branchy. MALE FLOWERS very numerous, about the female ones, sessile, without bractes. *Calyx* one-leaved, small, three-cornered, three-parted smooth. *Petals* three, oblong, rigid, striated, smooth, many times longer than the perianth. *Filaments* generally three, very short and broad, two-parted, inserted round the base of the abortive germ. *Anthers* always six, sagittate *Germ* no other than a short culm, which splits into three short, obtuse segments. FEMALE FLOWERS one, two, or three, at or near the base of each ramification of the spadix, sessile without bractes. *Calyx* three-leaved; *leaflet* cordate, rigid, fleshy, permanent. *Corol* three-petalled, like the calyx, and permanent. *Nectary* membranaceous generally six toothed, embracing closely the base of the germ. *Germ* oval. *Style* scarcely any. *Stigmas* three short, triangular. The *drupe* is well described, and delineated by Gærtner, *vol.* i. *p.* 19. *t.* 7. *f.* 2.

On the Malabar coast the common black pepper vine is usually trained up to this tree, which renders it more useful in those parts, than any other." *Roxb. o. c. l. c.*

HAB.—Commonly cultivated, especially to the eastward, where it attains a much larger size than in Bengal Sanscrit, *Goorvaka*, Bengallee, *Gooa*. Arabic, *Foolful*. Pers. and Hind. *Soopara*. Telingee, *Poka Chelloo*. Malayan *Pinang*.

OBS.—It is very extensively cultivated in most of the warmer and more humid parts of India, especially towards the sea, near which alone it comes to perfection. It thrives much more luxuriantly on the Tenasserim coast and in the Straits of Malacca than in Bengal; the nut is also much more immoderately used by the Burmese and Malays than the Bengallees.

Several varieties with particular names exist among the Malays, and merit perhaps as much attention as those of the Cocoa-nut.

2. ARECA TRIANDRA.

TAB. CCXXX. A.

A. triandra. *Roxb. Icones. Suppl.* 65, (incompl.) *Fl. Ind.* 3. *p.* 617. *Buch. Hamilt. Comm. Hb. Amb. in Mem. Wern. Soc. 5. p.* 310. *Mart. Palm. t.* 149.

Fruticosa, sobolifera, foliis pinnatim fissis, pinnis longe et oblique acuminatis, superioribus apice fissis, terminali furcata plurifissa fissuris bidentatis, spatha 1, fl. masculis binatis, petalis oblongis obtusis, staminibus 3, femineis ad basin ramulorum solitariis, drupa oliviformi mammillata.

The description of this species is taken of from plants in the H. C. Botanic Gardens, that of the fruit is borrowed from Roxburgh aided by Dr. Martius' figure.

It is shrubby, throwing out offsets at the base. The *stem* is five to seven feet high, green, distinctly annulate, one and a half inch in diameter.

Leaves four or five feet long. *Pinnules* alternate, linear ensiform, thirteen to sixteen inches long, one and a half to two inches broad, often falcate, much, and obliquely acuminated; above, one to three keeled according to the breadth, which is variable; colour bright green, the upper ones more or less split at the apex: the terminal ones are broadly cuneate, deeply bipartite, forked, lobes truncate, divided into as many narrow, bidentate lobes as there are keels on the under surface.

Spathe green, smooth, with a short blunt point, varying from six inches to a foot long, and two to three inches broad: texture leathery. *Spadix* highly divided; peduncle and branches compressed; at the base of the lowermost branch a linear. *bract* occurs, half inch long; branches spreading, ascending, much divided; secondary divisions stoutish towards the base, where they bear a female flower, close to which they branch into two slender flexuose spikes, (on which the male flowers are seated), or more frequently are attenuated into one.

MALE *flowers* angular, small, cream-coloured, in pairs pressed together and secund on the outer side of the spikes. *Sepals* three, minute, ovate-oblong, unequal. *Petals* oblong, obtuse, valvate, three or four times longer than the sepals. *Stamens* three, opposite the sepals; *filaments* stout, short, united at the base; *anthers* sagittate. *Rudiment* of the *Pistillum* conical subulate.

FEMALE *flowers* rather large, generally placed between a pair of rudimentary males, suffulted by two broad, short, pointed *bractes*. *Sepals* roundish, green. *Petals* similar, but smaller and less tough. Six very small *rudimentary stamens*. *Ovary* ovate, one-celled, white. *Ovule* one, ascending. *Style* 0. *Stigma* of two, or generally three erect unequal acute lobes.

Fruit oblong, of the form of an olive, but longer, distinctly mammillate, smooth, when ripe of a lively orange, colour at length becoming red. Pulp in small quantity, and mixed with many longitudinal strong, ligneous fibres. *Seed* conform. *Albumen* much ruminated. *Embryo* basilar.

HAB.—Woods; Chittagong, Rungpore. Bengallee names *Bungooa, Ramgua, Runi Supari. (Buchanan Hamilton)*. Cultivated in the H. C. Botanic Gardens; in flower most of the year.

Areca triandra

3. ARECA LAXA.

A. Laxa, *Buch. Hamilt. Comm. in Hb. Amb. in Mem. Wern. Toc.* 5. p. 30. Pinanga sylvestris glandiformis secunda, *Rumph Hb. Amb.* 1, *p.* 39.?

Arborea, trunco sæpius incurvo nunquam stricto, foliis pinnatis, pinnis lanceolatis acutis integerrimis æquidistantibus, spatha 1-phylla, staminibus 3, rudimento pistilli nullo.

The following description of this species is taken from Buchanan Hamilton.—*Trunk* twenty or thirty feet high, annulated, green, tumid, generally incurved, never straight as in *A. Catechu*. *Leaves* pinnate; *pinnæ* lanceolate acute, quite entire, æquidistant, two-nerved with four-plaits; *petiole* pinniferous from the middle upwards?

Spathe one-leaved, lanceolate, acute, margined. *Spadix* panicled, branches angular.

Male *flowers* very many minute, in pairs. *Sepals* three, rigid, lanceolate, acute. *Stamens* three; *filaments* scarcely any; *anthers* oblong. *No rudiment* of *Pistil*.

Female *flowers* situated towards the bases of the spikes, solitary, few, much larger than the males. *Sepals* convolute, ovate, concave. *Petals* convolute, ovate, acuminate, longer than the calyx. *Ovary* obsoletely trigonal, ovate, acuminate. *Style* none. *Stigma* acute. *Fruit*——

Hab.—Andaman Islands. *Buchanan Hamilton.*

Obs.—Buchanan Hamilton, from whose description the above is adopted, states that it is closely allied to *A. triandra*, and that the nuts are used instead of the Betel-nut by the convicts confined on the island. Buchanan Hamilton makes no mention of the petals of the male flower. I have no knowledge of the species myself.

4. ARECA NAGENSIS.

Arborea, procera, foliis pinnatim fissis, pinnis linearibus obliquis acuminatissimis, spadice spithamæo, fl. femineis ramorum pluribus, fructibus angusto-ovatis utrinque attenuatis præsertim apice mammillato.

The description of this species is derived from imperfect specimens of leaves, and an imperfect spadix with immature fruit with which I was favoured by Major Jenkins, and a perfect fruit received from Mr. Owen. "Trunk thirty or forty feet high, attached to the soil by innumerable black fibrous roots." Naked part of the *petiole* about three feet long. *Lamina* four feet long. *Pinnules* sub-opposite or alternate, falcate, very acuminate, nineteen or twenty inches long, about one and half inch broad, above with two or three stout keels; the terminal one deeply bilobed, variously partite, the lanciniæ or divisions bidentate; the less divided broader part is obliquely truncate with irregular teeth.*

Spadix about a foot long; peduncle compressed, branched from near the base, branches stout flexuose. A scale-shaped *bract* under each *female flower*, several of which occur on the lower parts of the branches.

* The leaves may be open to doubt, from their resemblance to those of *A. gracilis*.

Sepals round oblong, obtuse, *petals* larger sub-cordate with a short obtuse cuspis. *Fruit* oblong-ovate, one inch long and five lines wide, attenuated to both ends, base surrounded by the *perianth*, apex rostrate mammillate, truncate, with a small mammilla in the centre: fibres numerous, stout, whitish. *Seed* erect, ovate, half an inch long, marked with many veins arising from the hilum, these are generally dichotomous, anastomosing reticulately on the dorsal face. *Albumen* cartilaginous, horny, ruminate, opaque white. *Embryo* basilar.

Hab.—Assam? *Major Jenkins*, Naga Hills, up to an elevation of eight hundred feet above the level of the sea, affecting banks of rivers. Name of the tree in Naga, *Tàl-pàt*; Singpho name, *Tongtau*; of the nut, Nagas *Kàwe*; Assam, *Tàmul*. *(Mr. Owen)*.

Obs.—This appears distinct by its roots and fruit. The latter is according to Mr. Owen, used by the Nagas and Abors instead of the Betel-nut; the leaves are much like those of *A. gracilis*. Mr. Owen informs me, that it is very scarce, and courts high situations generally on river sides.

Both this and *A. laxa* require further examination.

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5. ARECA COCOIDES.

Tab. CCXXX. B.

Arborea, procera, foliis pinnatis pinnis linearibus acuminatis bipartitis, spathis ——— fl. masculis binatis polyandris, fœmineis paucis bases versus ramulorum undique insertis, stigmatibus 3-revolutis, drupa ovata magnitudine ovi gallini.

This is a lofty palm. *Trunk* forty feet high. *Crown* dark green, ample. *Leaves* pinnate; *petiole* scurfy plano-convex: *lamina* eight or nine feet long, four, or four-and-a-half broad, in outline lanceolate acuminate; *pinnules* two feet long, 1¼ to 1½ inch wide, linear, acuminate, unequally bipartite, shining, very smooth, uppermost inequilateral, sub-erose at the points: central vein and five others forming as many keels above, the central one underneath bearing scales attached by the base.

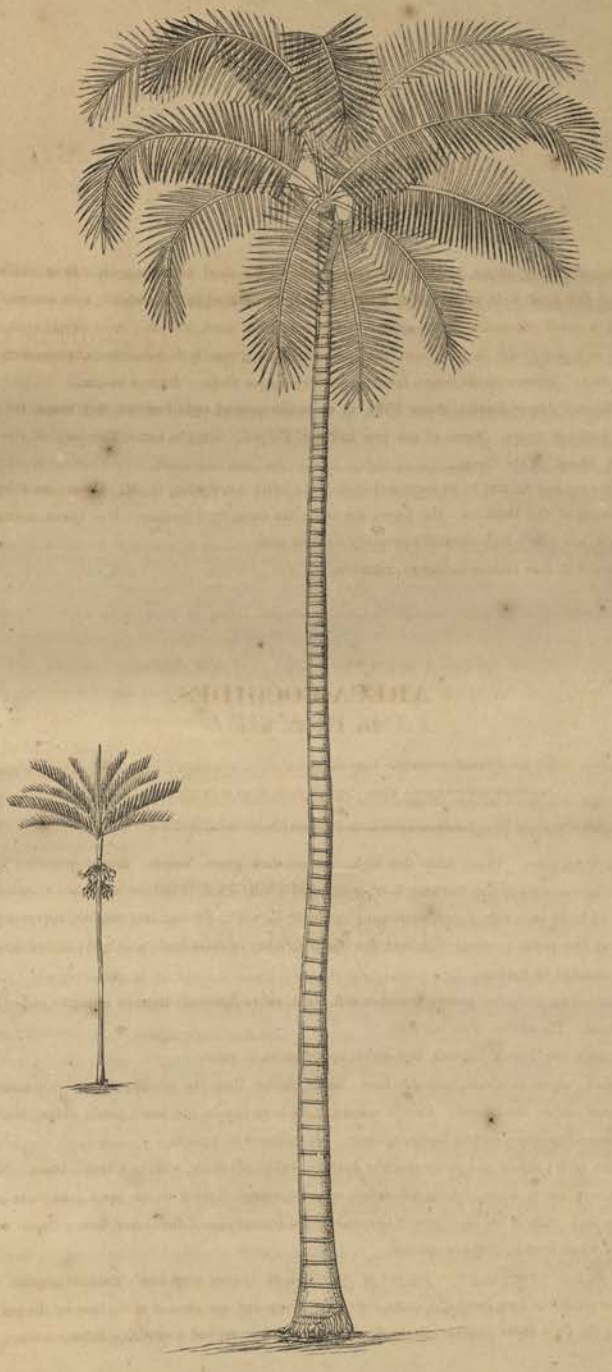
Spadix ascending, altogether green; branches stiff, stout, above flexuosely torulose owing to niches in which the flowers are lodged. The *spathes* were not seen.

Lower *flowers* one female between two males, upper males, in pairs.

Males small; *sepals* imbricate, carinate, hard, much shorter than the corolla, margins sub-membranaceous, denticulate, inner rather the longest. *Corolla* valvate, hard, tripartite to the base; *petals* oblong-lanceolate, sub-obtuse. *Stamens* numerous; *anthers* linear-sagittate. No *rudiment* of a *pistil*.

Female (in bud); *sepals* and *petale* scarcely distinguishable, imbricate, with very broad bases. No *rudiments* of *stamens*. *Ovary* large, white, oblong, one-celled, sub-compressed, divided at the apex into three-cuneate sub-recurved lobes, each with a line of stigmatic tissue along the central line of the inner face. *Ovule* one, attached nearly along its whole length; *foramen* inferior.

Spadix of the fruit spreading, presenting one or two annuli on its very stout base: branches angular, thickened at the base. *Fruit* pendulous from its weight, ovate, the size of a large egg, surrounded at the base by the perianth, at the apex presenting the three styles: colour orange, smell unpleasant like spoiled sour fruit; outer substance thick, firm,



Areca cocoides Griff.

consisting of yellow cellular tissue and longitudinal fibres, which are more numerous towards the putamen. This is thin, hard, crustaceous. *Seed* one, erect; *tegument* thin, shining, light brown. *Albumen* densely horny, much ruminated. *Embryo* basilar.

Hab.—Cultivated at Malacca, but not commonly. It occurs in a garden at the Dutch Redoubt; also half way to Malim. Malayan name, *Pinang Punowur.*

Obs.—The aspect of this Palm is very different from that of *A. Catechu*, the size being much greater, the crown blackish-green, the leaves stiffer, and at a distance having a truncate appearance. The Malacca specimen when viewed closely has the appearance of a cocoa-nut tree. It is also to be known from *A. Catechu* by the round torulose branches of the spadix, the binary not solitary distichous polyandrous males, by the females not being secund, and by their greater number, by the recurved not connivent styles, and by the fruit.

The fruit is, I believe, considered a medicinal kind of betel-nut, I have not however been able to trace the history of the plant, or its native place. Can it be Pinanga Calapparia of Rumphius?

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6. ARECA PUMILA.

A. pumila, *Mart. Palm. t.* 153. *f.* iv. v. (spadice inverso).

Arbuscula, foliis pinnatis, pinnis alternis 2½-pedalibus lineari-ensiformibus præ-acuminatis, spadicis ramis sub-4 undique florigeris, fl. masc. sepalis subulato-setaceis quam petala obliqua ovato-cuspidata paullo longioribus, staminibus 6, fl. fœm. stigmate obtuse-conico trisulcato, fructibus undique insertis ovatis (aurantiaceis).

Stems ten or twelve feet in height, 1¼ to 1½ inch in diameter, distinctly annulate.

Leaves eight or nine feet long; *sheaths* subventricose, about two feet long, inside of a shining chesnut colour. *Petiole* bearing pinnules nearly to the base where it is channelled, elsewhere trigonal; *pinnules* alternate, two and a half feet long, ½ an inch to 1½ inch broad, sword-shaped, very acuminate, coriaceous, bright-green, above two keeled with an obsolete intromarginal keel on each side.

Inflorescence whitish-yellow. *Spadix* while included in the spathes shortly sword-shaped. *Spathe* about a foot long, linear, two-edged, flattish posticously anticously ventricose, coriaceous, chesnut-coloured, obtuse and sometimes trifid at the point, here and there presenting spots of adpressed hairs.

Spadix peduncle about one and half inch long, and on the middle of the outer face, is a semi-circular scar marking the attachment of the spathe, a little above this, is a membranous spathelle, acuminate from a very broad base: a smaller one at the base of each lateral branch; *branches* about four, level-topped, pendulous, about a span or a foot long. *Flowers* about four-ranked, sessile, whitish-ochroleucre, throughout one female between two males.

Male *flowers*; *sepals* nearly an inch long, triangular-subulate, canaliculate, and exceedingly acuminate. *Petals* oblong-ovate, oblique, valvate, long cuspidate, but shorter than the sepals. *Stamens* six; *anthers* linear, those opposite the petals longest. *Pollen* ovate, one plicate, white. No *rudiment* of a *Pistil?*

Female *flowers*; *sepals* roundish, imbricate. *Petals* similar, a good deal smaller. No *rudiments* of *stamens.*

Ovary white, roundish, one-celled; *ovule* one, appense. *Style* wanting. *Stigma* obtusely conical, large, obscurely trisulcate, almost three-lobed.

Spadix of the fruit with about four simple, roundish, greenish-white branches. *Drupe* oblong ovate. one inch long, five or six lines broad, orange-coloured, mammillate at the apex, base surrounded by the perianth. *Seed* erect, oblong. *Albumen* horny, ruminate. *Embryo* basilar, rather oblique.

HAB.—In a ravine of the dense forest near Ching, Malacca; one specimen only has been observed. Its Malayan name is *Pinang Jirong*.

OBS.—This species is closely allied to *A. malaiana*, but is at once distinguishable by the tetrastichous not distichous inflorescence, the sepals, number of stamens and the orange, not sanguineous colour of the fruit.

Figure 11, 6, Plate *Seaforthia Reinwardtiana, Mart.* Palm. gives a tolerable idea of the fruit-spadix of this species. Judging from Dr. Martius' figure, it varies a good deal in the size of the inflorescence and fruit.

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7. ARECA MALAIANA.

TAB. CCXXX. C.

Seaforthia malaiana. *Mart. Palmæ, p.* 184. *t.* 158, *f.* 3.

Arbuscula, foliis pinnatis, pinnis alternis 1-2-pedalibus linearibus valde acuminatis subtus glaucescentibus, spadice 3-5-ramoso, fl. masc. sepalis lanceolato-acuminatis quam petala obliqua acuta inæqualia multo minoribus, staminibus circiter 40, fl. fœminei nullis, stigmatibus discoideis, fructibus distichis ovatis (sanguineo-purpureis).

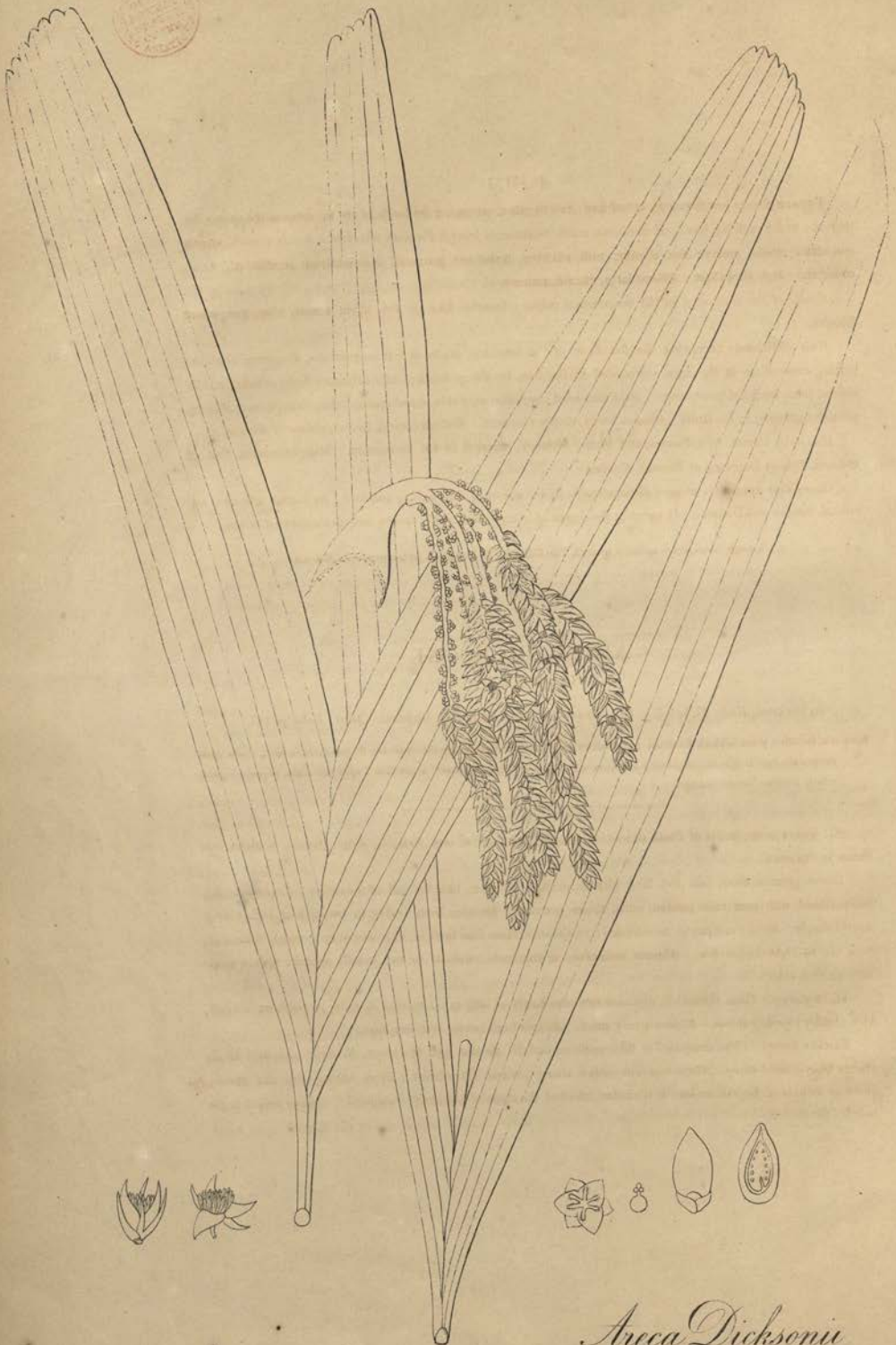
An elegant Palm, eight to twelve feet in height, having the appearance or habit of the preceding. *Stem* distinctly annulate, in diameter scarcely an inch, internodes generally subclavate. *Crown* composed of five to eight spreading leaves.

Leaves five to eight feet long; *sheaths* one, or one and a half foot long, leathery, striate; *petioles* (below the pinnules) 1¾ to 1½ foot long, channelled, otherwise triangular. *Pinnules* alternate, linear, one and half to two feet long, and eight or ten lines broad, very much acuminated; above two-keeled; underneath with one-keel and a vein on either side, of whitish glaucescent colour: upper pinnules cuneate, deeply bipartite, segments bilobed, lobes generally bifid; terminal portion deeply bipartite, obliquely præmorse, segments with several lobes, themselves obtusely bifid.

Spathe oblong, ten inches long, and two and half broad, of a leathery or papery texture, with a broad obtuse cuspis, opening along, the upper face. *Spadix* about six inches long; the undivided part of the peduncle an inch and half long, compressed, with one oblong-linear bract a little above the middle; *branches* 3 to 5 in number, crowded with flowers, compressed, flexuose.

MALE *flower* large, pressed, together and flat, quite concealing the female. *Sepals* three, membranaceous, lanceolate acuminate. *Petals* much larger, unequal, one as large as both the others, cordate, the others half cordate, all acute or acuminate, and of a hard texture. *Stamens*, inserted on a convex torus, about 40 in number; *filaments* very short; *anthers* linear, about twice as short as the petals.

Areca malaiana. Mart.



Areca Dicksonii

FEMALE *flowers* less advanced, occasionally two together, occupying the bends of the flat faces of the spikes, distichous: under each is a broad, membranous, much acuminated *bract*. *Perianth* urceolate. *Sepals* cordate, shortly cuspidate. *Petals* smaller and shorter, with minutely fimbriated margins. No *rudiments* of *stamens*. *Ovary* roundish. *Style* very short. *Stigma* large, discoid, concave.

Spadix of the fruit of a bright sanguineous colour; *branches* four or five, about a span long, compressed flexuose.

Fruit distichous; occupying the flat faces of the branches, ovate, at first sanguineous, afterwards blackish-purple, mammillate at the apex, surrounded at the base by the perianth; outer substance fleshy cellular, middle fibrous, inner hardened crustaceous. *Seed* one, erect; *tegument* very thin, membrano-cellular, veiny, brown, shining, generally adhering to the fruit. *Albumen* horny, deeply ruminate. *Embryo* conical, basilar, obliquely situated.

HAB.—In forests, Ayer Punnus, and Rhim, Malacca; where it is not uncommon. Malayan names, that of Malacca, *Penang Booreng;* of Penang, *Kurdoo*.

OBS.—This species is at once distinguishable by the colour of the spadices and fruit; its nearest affinities are with *A. disticha* and *Dicksoni*. It varies in the degree of compression of the spikes, and also somewhat in size.

A rough sketch of this species is annexed, Tab. CCXXXII.C. Fig. II. A. hematocarpon Gr. Mss. ED.

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8. ARECA DICKSONI.

TAB. CCXXXI.

A. Dicksoni, *Roxb. Fl. ind.* 3. *p.* 616. *Icones.* 14. *t.* 76. Seaforthia Dicksoni. *Mart. Palm. p.* 184.

Arbuscula, frondibus pinnatis, pinnis linearibus 1-2-pedalibus apice præmorsis dentatis, spadicis ramis 4-8, floribus distichis, masc. sepalis canaliculato-subulatis longitudine petalorum acuminatorum, staminibus 20-30, fœm. staminibus sterilibus 6 apice penicillatis, stigmate capitato trilobo, fructibus distichis oblongis.

"It grows to the height of about sixteen or eighteen feet, with a very straight, simple trunk, of about two inches in diameter.

Leaves pinnate, about four feet long, with extremities bifurcate, like the tail of a swallow. *Leaflets* sessile, linear, ribbed, with numerous parallel veins, apices præmorse, dentate; from twelve to twenty-four inches long. *Spathe* simple. *Spadix* compound, retrofracted; *ramifications* from four to eight, alternate, simple, equal, distichous; from six to eight inches long. *Flowers* numerous, approximate, alternate in two exactly opposite rows, a single male on each side.

MALE *flowers*. *Calyx* three-cleft, divisions subulate, nearly as long as the corolla. *Corolla, petals* three, cordate, with slender tapering apices. *Filaments* very short. *Anthers* from twenty to thirty, linear.

FEMALE *flowers*. *Calyx* composed of three reniform leaflets. *Corolla* like the calyx. *Nectary*, composed of six clavate hairy-headed scales. *Germ* superior. *Style* short. *Stigma* three-lobed. *Berry* oblong, dry and fibrous, about an inch long, by half an inch in diameter. *Seed* of the shape of the berry, ruminated. *Embryo* lodged in the base." (*Roxb. l. c.*)

HAB.—Mountains of Malabar, where according to *Dr. Dickson*, and *Dr. Wight*; it flowers and ripens fruit in August.

"Mr. Dickson, the Surgeon at Bedanore, who first brought the plant under my observation, observes that the nut is used by the poorer people, as a substitute for the common *Areca*, but no other part of the tree is turned to useful purpose." (*Roxb.*)

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9. ARECA GRACILIS.

TABS. CCXXXII. A.B.C.

A. gracilis. *Roxb. Icones Suppt.* 5. *t.* 64. *Fl. Ind.* 3. p. 619. *Buch. Hamilt. Comm. in Hb. Amb. Mem. Wern. Soc.* 5. p. 311. Seaforthia gracilis. *Mart. Palm.* p. 185.

Fruticosa, foliis pinnatim fissis, sub-pedalibus falcatis oblique accuminatissimis, spadice simplici vel 2-3 ramoso undique florigero, spatha 1, fl. masc. calyce minuto, petalis oblique cordatis acutis multoties majoribus, staminibus numerosis, fl. fœm. rudimentariis o. stigmate infundibuliformi, fructibus ovatis acutis undique insertis.

The description of this species is derived chiefly from specimens without the spathes communicated by Major Jenkins.

Stem slender, arundinaceous, about eight feet high, six to eight lines in diameter, distinctly and distantly annulate. *Crown* of about five or six leaves, which are about three feet long; *sheath* half foot long; the naked part of the *petiole* is three or four inches long. *Pinnules* about a foot long, two or three inches broad, much and obliquely, acuminate; above 2 or 3-keeled: the terminal ones are obcuneate, about a foot long, and six inches broad across the sinus, truncate bipartite to the middle, about eight cleft, divisions bidentate, emarginate, or entire and acute.

Spadices generally simple, sometimes twice or thrice branched, six to nine inches long, compressed, bearing flowers on all sides. An annulate scar is situated just above the base of the peduncle, and a second one at the commencement of the pendulous part.

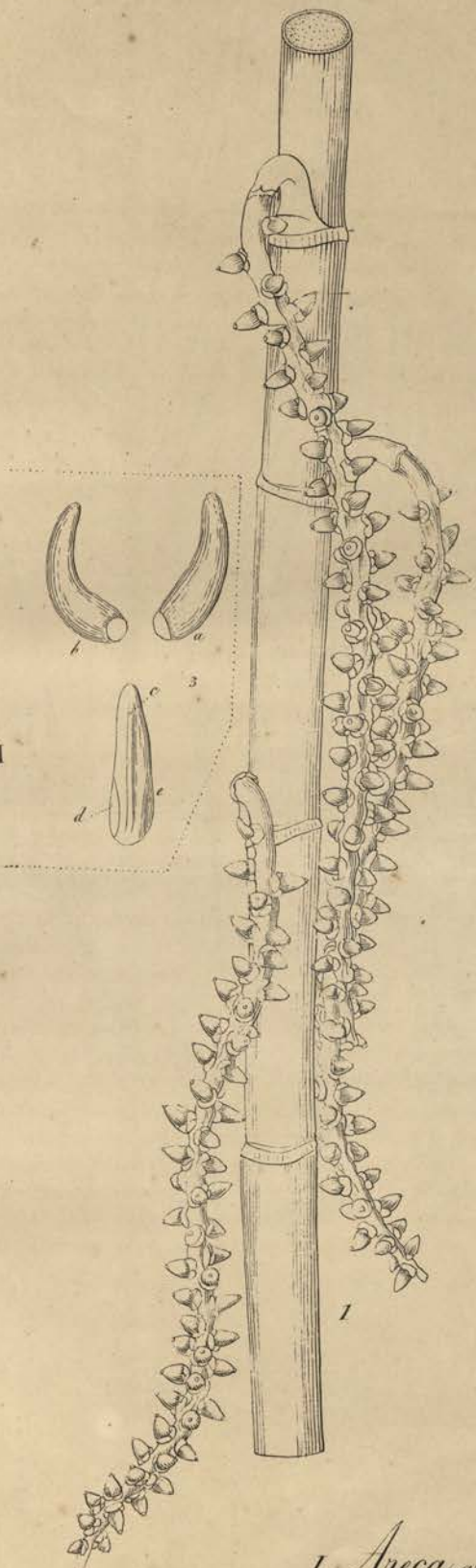
MALE FLOWERS. *Calyx* minute, three cornered. *Petals* three, obliquely cordate, acute, many times longer than the calyx. *Stamina* numerous, shorter than the corolla.

FEMALE. *Flowers* occupying large shallow niches with three toothed margins. *Sepals* broad, round. *Petals* like the sepals, but smaller. No *rudimentary stamens*. *Ovary* ovate, one celled; *ovule* one, erect. *Style* very short, stout. *Stigma* large, infundibuliform, with ragged edges. (*Roxb.*)

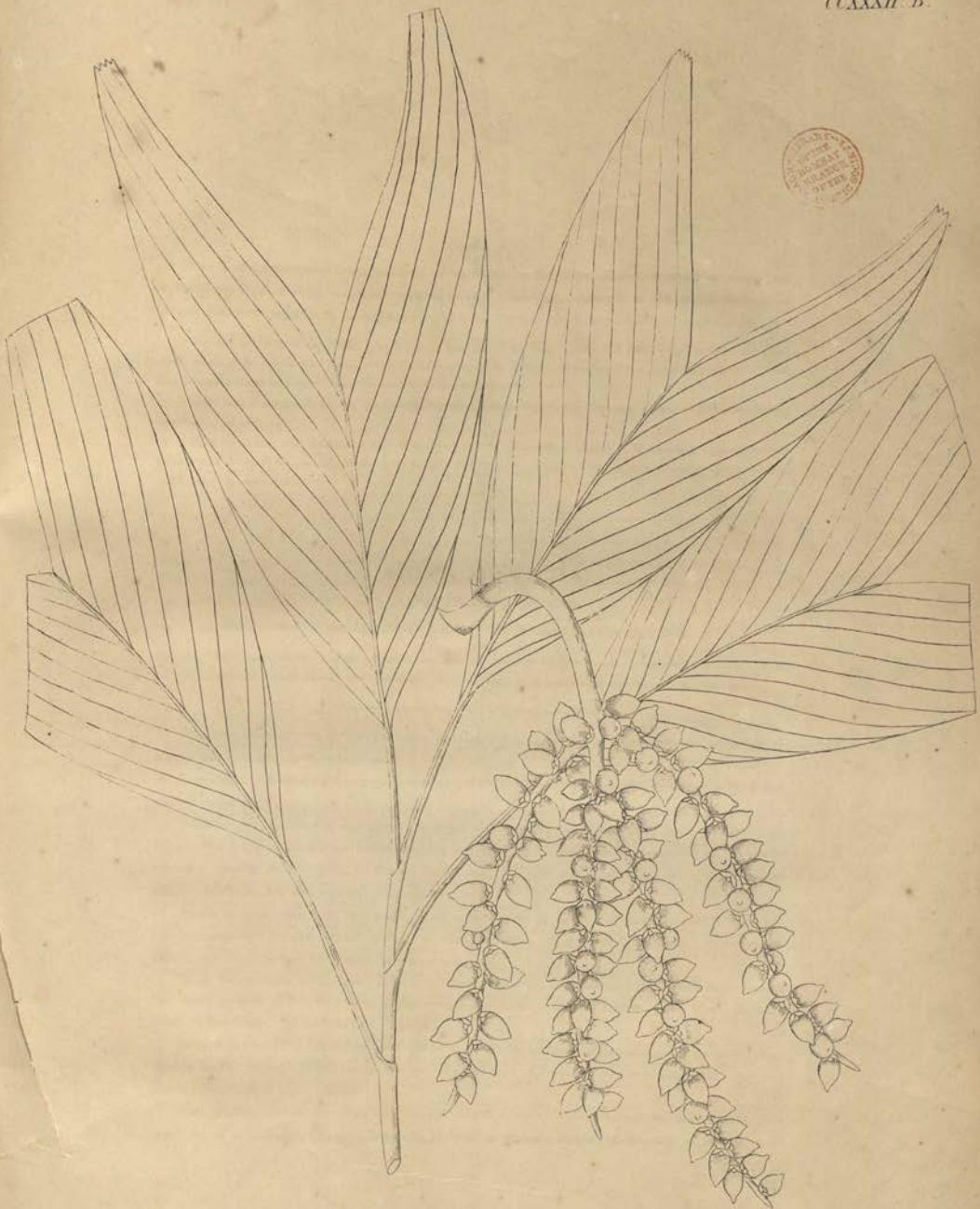
Drupe reddish, ovate, with an attenuated base and blunt point, eight lines long, and three or four broad. *Seed* ovate. *Albumen* highly ruminate. *Embryo* basilar.

HAB.—Hills near Sylhet, (where it is called *Gooa*, *Supari* and *Ramgoa*), Chittagong and the Eastern border of Bengal (*Roxburgh*). Goalparah, (*Buchanan Hamilton*). Assam, where it is called *Girgoa?* (*Major Jenkins*). About Kujoodo, and Ningrew in Upper Assam, where it fruits in January; and in the mountains below Darjeling.

Areca gracilis



1. *Areca gracilis.*



Areca gracilis. Roxb.

Obs.—I have some specimens communicated by Major Jenkins, and others collected by myself in Assam and on the Khasya Hills, of which I subjoin descriptions, as they either shew a tendency in this species to vary, or the existence of two other nearly allied species.

The *stem* apparently is very slender. *Leaves* scarcely more than a span long; *petioles* 2-3 inches long, triangular, ferruginous scurfy; *sheaths* of the same length; *lamina* cuneate, bilobed to or beyond the middle, 7-8 inches long, 2 broad across the sinus, not coriaceous, lobes obliquely acuminate with twice as many acute teeth at the apex as there are keels.

Spadix with 4 sub-digitate branches, the lowest arising about 2 inches from the base of the peduncle, they are 3-5 inches in length, spreading and not compressed.

Fruits tetrastichous, ovate, attenuate at the base and surrounded by the cup-shaped *perianthium*, 6½ lines long, 3½ broad, distinctly mammillate at the apex; substance thin, fibres tolerably copious. *Seed* one, erect. *Albumen* horny, very much and deeply ruminate. *Embryo* basilar, rather obliquely situated.

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10. ARECA DISTICHA.

Tab. CCXXXIII. A.

A. Disticha, *Roxb. Icones.* 14. *t.* 77. *Fl. Ind.* 3. *p.* 620. Seaforthia disticha, *Mart. Palm. p.* 184.

Fruticosa, foliis bipartitis vel pinnatis, pinnis oppositis acuminatis, spadice simplici vel 2-3-ties ramoso, fl. maso. petalis inæqualibus obliquis cuspidato-acuminatis calycem minutum multo excedentibus, staminibus circiter 15, fl. fœminei nullis, fructibus ovatis attenuatis distichis.

Stem arundinaceous with distinct subclavate lengthened joints; varying in height from one and a half, to three or four feet; parts lately exposed scurfy.

Leaves rather distant, in the larger specimens four and a half feet long, of which the naked base of the *Petiole* is about six inches.

Pinnules opposite, about a foot long, exceedingly and obliquely acuminate, above three or four-keeled; terminal lobe deeply bipartite, many keeled, truncate and lobed at the apex: the bilobed leaves of the smaller specimens cuneate, forked, twelve or fourteen inches long, and two and a half inches across the sinus, apex obliquely præmorse, four or five-parted, divisions obtuse, bifid.

Spadix three or four inches long, simple in the smaller specimens, two or three times branched in the larger; *branches* compressed, flexuose. *Spathe* oblong, about four inches long, and one inch broad, acute. *Flowers* closely packed; one female between two males: the former distichous.

Male *flowers* rather large, angular *Calyx* membranaceous, minute, three-toothed. *Petals* much larger, unequal (one nearly as large as both the others), oblong, oblique, cuspidate-acuminate. *Stamens* about fifteen; *filaments*, short; *anthers* linear. No *rudiment* of a *Pistillum*.

Female *flowers* with a broad short bract at their base. *Perianth* consists of six coriaceo-scarious leaves, about equal in length; the inner (petals) are the smallest. No *rudiments* of *stamina*. *Ovarium* oblong-ovate; *style* very short; *stigma* large, obliquely discoid.

Fruit spadices three to six inches long, branches slender, flexuose. *Fruit* orange-coloured or red, exactly distichous, one at each flexure, oblong, 6½ lines long, 3½ broad, mammillate-attenuate at the apex, surrounded at the

base by the cup-shaped perianth. *Seed* of the same shape, covered by a chartaceous integument, marked with longitudinal lines along which the integument is inflected. *Albumen* horny, ruminate. *Embryo* minute, conical, basilar.

HAB.—Malacca in dense forests, Ayer Punnus, not uncommon; and Pinang. Malayan name, *Pinang Boorang Paday*. It also occurs in Khasyah mountains, at an elevation of 4000 feet. Moosmai, near Churra Punjee: also I think in Assam.

OBS.—This is closely allied to *A. disticha*, but is distinguishable by the more branched stouter spadix, the tetrastichous fruit, its larger size, and distinctly mammillate apex. The stigma, judging from one abortive pistillum, is also 5-lobed. If the specimens of the leaves belong to the same plant as the spadix, it becomes probable that they are the mature form.

It would also appear to be allied to *A. Dicksoni*, from which it may be distinguished by the absence of sterile stamina, and the small mammillate fruit

This plant varies much in size. Roxburgh describes the branches of the spadix as woolly: his drawing also, represents the petals as acute, not cuspidato-acuminate.

In the Assam and Khasyah plants, the stem and leaves are much the same as in *A. gracilis*.* The *spadices* more slender, and 3 or 4 times branched. *Female flowers* distichous, distant. The specimens from Malacca called *Pinang Boorang Paday*, from which the description of the male and female flowers is taken, are of a much larger stature in every respect, the spadices also are branched, the fruit much more elongated, and with a tendency to be curved. Further examination may show them to be distinct species.

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11. ARECA PARADOXA.

Fruticosa, nana, foliis pinnatim fissis, pinnis inæqualibus oblique acuminatis, spadice simplici, fructu subulato curvato (albo) albumine æquabili.

Stem slender, five to seven feet high, three or four lines in diameter, annulate, upwards roughish with ferruginous down. *Crown* consisting of six or eight leaves.

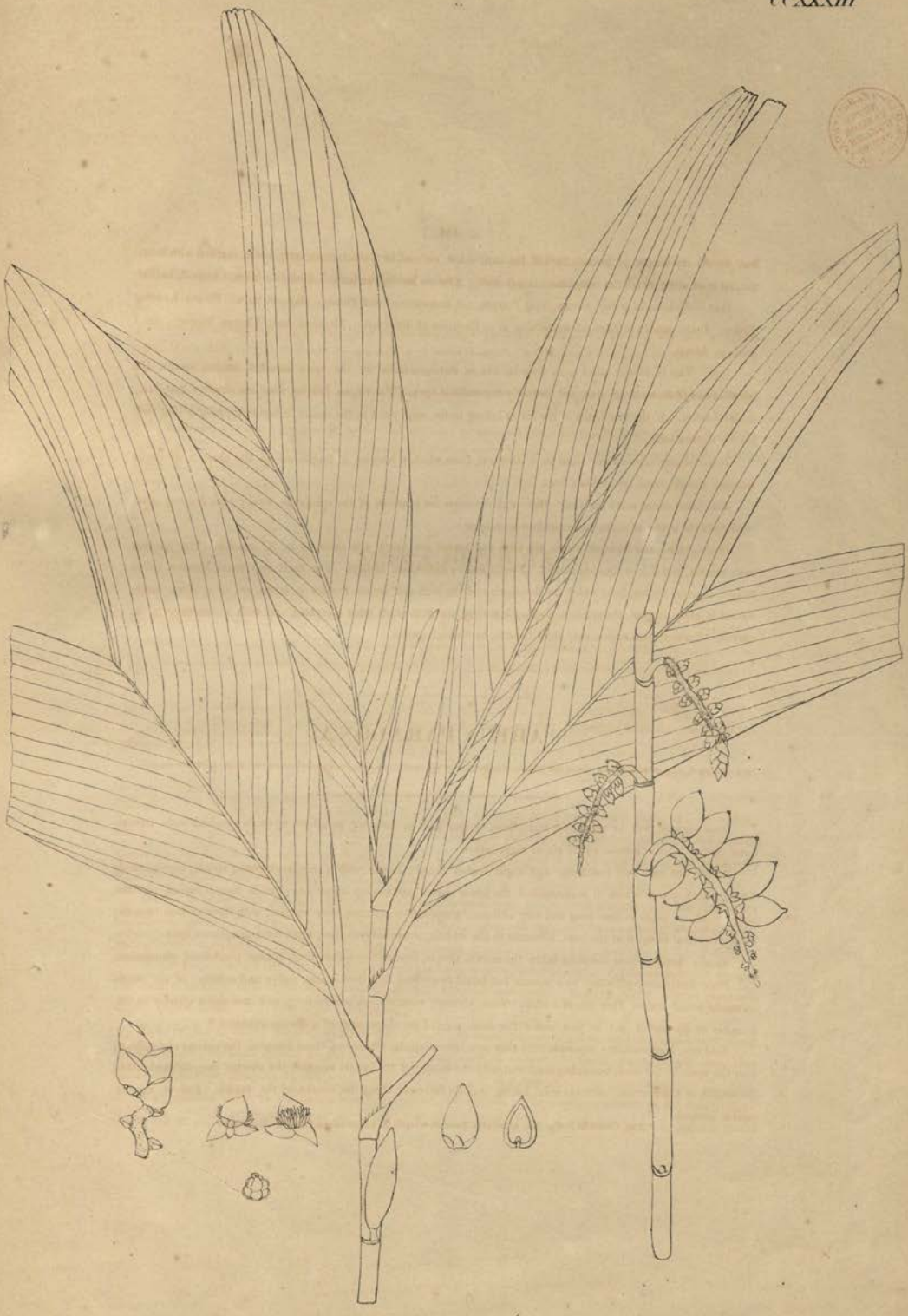
Leaves one and half foot long, and eight inches broad; *petiole* with a long, coriaceous, striate, ferruginously downy *sheath*, above which it is channelled, the lower naked part being about six inches long; *lamina* pinnate, *pinnules* six or eight inches long and very obliquely cuspidato-acuminate, very unequal, with three or four or many keels; terminal unequal at the base, bifurcate to the middle, irregularly toothed, teeth bifid sometimes split.

Spadix issuing from the stem below the crown, simple, four or five inches long, obtuse, pendulous, glaucescent.

Fruit distichous, suffulted by a minute but broad bract, and by a double cup, (calyx and corolla) of six round imbricate broad scales. They are of a white colour, obtusely subulate, eight lines long, and one and a quarter in the diameter of the widest part or just above the base, curved in shape, and of a fibrous subtance.*

Seed one, conformable; *tegument* very thin membrano-cellular; *raphe* of three fascicles, the central one reflexed near the apex of the seed, becoming confluent with the longer of the lateral vessels; the shorter one reflexed about the middle of the dorsum. *Albumen* solid, horny, slightly furrowed along the course of the vessel. *Embryo* minute, basilar, conical.

* Tab. CCXXXII. Fig. III. *a*, fruit: *b*, Embryo, *c*, raphe, *d*, longer lateral vessel, *e*, shorter ditto.



Areca dushcha

Areca tigillaria

Hab.—Dense forests near the base of Goonoong Miring, Mount Ophir; in fruit February, 1841.

Obs.—The specimen is scarcely distinguishable, except in the form and structure of the fruit and seeds, from *A. disticha*. That structure however is so different as to suggest the probability of its constituting a new genus.

12. ARECA TIGILLARIA.

Tab. CCXXXIII. B.

A. tigillaria. *Jack. Mal. Misc. (Calc. Journ. Nat. Hist. 4. p. 12.)*

Arborea, pinnis bipedalibus pendulis, spatha exteriore pedunculoque armatis, interiore subinermi, floribus distantibus, sæpe 1 fæmineo 1 masculo, petalis ovatis in setas subito attenuatis, fructibus globuli sclopeti minoris magnitudine.

This is a very elegant palm. *Trunk* thirty or forty feet high, distinctly annulate, armed, surrounded with offsets at the base. *Crown* dense and graceful.

Leaves pinnate, ten or twelve feet in length; *petiole* roundish, armed, upwards very scurfy; *pinnules* about two feet long, conduplicate at the base, very much acuminate, pendulous, coriaceous, many-veined, the principal keel above excentric, ferruginous scurfy, underneath bearing scales attached by their middle.

Spadices arise from the axillæ of lately fallen leaves; *peduncle* slightly armed; branches many, long, undulately flexouse, the lower ones divided, the upper simple with a rudimentary *bract* at the base of the lower ones.

Spathes (complete) two, boat-shaped, bicarinate, of a stout texture, outer green, covered here and there with whitish ferruginous scurf, armed on the dorsum, especially about the carinæ; the inner almost unarmed, but more scurfy, and velvety to the touch.

Flowers crowded, one female between two males, or in pairs consisting of one male and one female, the former the more advanced of the two.

Male flowers. *Sepals* subcordate, cuspidate, carinate, the anticous one the largest. *Petals* three, valvate, coriaceous, suddenly acuminate into subulate bristles, spreading. *Stamens* six; *filaments* short, stout, cohering slightly with the petals; *anthers* large, sagittate, obtuse. Rudimentary *pistil* rather large, white, composed of three carpellary leaves which are distinct nearly from the base.

Female flowers suffulted by a broad inconspicuous bract. *Sepals* imbricate, suborbicular, concave, fleshy, coriaceous. *Petals* larger than the sepals, imbricate. *Rudimentary* stamens three or none. *Ovarium* roundish, of the size of a small pea, one-celled. *Style* none. *Stigmata* three, connivent. *Ovulum* appense pendulous.

Spadix of the fruit having branches one or two feet long, pendulous, purplish-sanguineous, with an articulated appearance. *Berry* globose, the size, of a small musket ball, surrounded at the base by the perianth, marked towards the apex on one side with an areola, bearing in the centre the remains of the stigmata, *endocarp* fibres few, thin. *Seed* appense just below the areola; funicle large, sub-intrant, so that the transverse section is sub-reniform. *Tegument*, thin, scarcely separable from the endocarp. *Albumen* horny, deeply ruminate. *Embryo* oblong-conical, basilar.

Hab.—On the borders of Paddy swamps, Malacca where it is common. Malayan name, *Nibong*. Also in forests at Lainear to the South of Mergui?

Obs.—The trunk of this palm is in much request for house-posts. Jack (l. c.) says, that there is only one spathe, and that the flowers are one male to two females, but that Author does not notice any obliquity of the fruit.

13. ARECA HORRIDA.*

TAB. CCXXXIII. C.

A. Nibung.† *Mart. Palm. t.* 153, *f. V?*

Arborea, pinnis 2-3 pedalibus patentibus spathis pedunculoque spadicis armatissimis, floribus congestis, femineo inter duos masculos, petalis lanceolato-oblongis in setas attenuatis, fructibus globuli sclopeti majoris magnitudine.

The description of this species is derived partly from dried specimens, but perfect spadices at the time of opening of the spathes were not seen. It is an elegant Palm, thirty or forty feet in height, sending off offsets at the base.

Trunk. This is annulate, and the spaces between the rings are much armed. *Crown* rather thin.

Leaves spreading in every direction, fourteen or sixteen feet long, five feet broad; *sheaths* leathery, much armed, two feet long; *petiole* bearing pinnules nearly from the base, green, stout, flattened at the base, compressed at the apex, otherwise trigonal, covered with brown irregular scales, armed throughout, but especially underneath, with black-brown flat not very strong spines;‡ *pinnules* alternate or sub-opposite, nearly linear, two or three feet long, subulate-acuminate, coriaceous, dark-green, above keeled along the centre, with two lateral plaits on either side, spreading or oblique, never pendulous, as in *A. tigillaria;* a few scales attached by the middle extend along the central vein underneath. *Threads* very fine, pendulous and at length become deciduous.

Spadix axillary; *peduncle* stout, yellow, flattened at the base, much armed on the spaces between the insertion of the spathes, above these unarmed; *branches* pendulous, flexuose, about equal, two or three times branched or simple, one or two feet long, each suffulted by a yellow bract with a broad base, the upper of which degenerates into scales.

Spathes complete two, acutely margined, coriaceous, armed with rather weak brown-black spines, 1 or 1½ foot long, of a greenish colour outside when mature, yellow and polished inside: the inner one is furnished with a stout, unarmed cuspis; and incomplete also two in number, cuspidate, armed, and very unequally conduplicate. *Flowers* about four-ranked, inserted just above a protuberance of the branch of the spadix; lower ones, one female between two males, upper males in pairs.

MALE. *Calyx* of three imbricate, carinate, sepals sub-membranaceous. *Petals* three, valvate, subulate or almost setaceo-acuminate. *Stamens* six, sagittate. *Rudiment* of a *Pistillum* rather large, of three, sometimes two, imperfect carpel-leaves.

FEMALE. *Calyx, sepals* roundish-cordate, imbricated. *Corolla* conical in the bud. No rudimentary *stamens? Ovarium* of one large complete carpel, and two incomplete ones§. *Style* none. *Stigma* (of the perfect ovule-bearing carpel) linear, running nearly half way to the base of the ovarium. *Ovulum* anatropous.

* A third species of the section *Euoplus*, with the habit of this species but smaller, is common on the cliffs of the sea-shore a little to the North of Koondoor, near Malacca. Its Malayan name is *Nibong Paday*. I have not seen it in flower or fruit.

† This name is scarcely tenable, the true Nibung being Areca tigillaria, JACK.

‡ This is the general character of the armature.

§ These are folded together, the margins united about the middle, above free, and evidently stigmatic.

Areca horrida. Griff

Spadix of the fruit; branches two or four feet long, pendulous, without spathes, each suffulted by a coriaceous acuminate broad-based bract. *Fruit* sessile, about the size of a musket-ball, of purplish-black colour, surrounded at the base by the perianth, oblique, the true apex pointed out by a conspicuous mammilla on one side near the middle; *epicarp* coriaceous; fibres very few: *endocarp* membranous. *Seed* round, appense pendulous, attached by a broad base, whitish-brown, reticulate with white veiny lines; *hilum* large, with a tendency to have an entering process. *Albumen* horny, deeply ruminate. *Embryo* not observed.

Hab.—Malacca. Common in densely wooded valleys and ravines, at Ching, and on wooded hills, at Laydang Soobubi, but rare. In woods at the base of Battoo Bakar. Malayan name, *Bhyass.*

Obs.—This species is allied to *A. tigillaria,* but is very distinct in the spathes and fruit. The flowers also are much more crowded, and generally appear to have the usual arrangement; viz. one female between two males. The young spadices (from the contrast in colour between the spathes and their spines and the waviness and adpression of these) have the appearance of tortoise-shell.

XIII. BENTINCKIA.

Berry MSS. Roxb. Fl. Ind. 3. *p.* 621. *Mart. Palm. p.* 229. *t.* 139. *Endl. Gen. p.* 251. *No.* 1749. Keppleria. *Mart. Endl. Gen. l. c. No.* 1750. (e Martio).

GENERIC CHARACTER.

SPATHES 2 or more the inner one complete. FLOWERS monœcious, in distinct spadices or seldom polygamous, immersed in niches, the masculine alternating in rows with solitary feminine. MASC. STAMENS 6. FÆM. Ovary trilocular. OVULE 1. BERRY oblique. STIGMA nearly sessile. SEED sulcate. ALBUMEN solid. EMBRYO basilar.

1. BENTINCKIA CODDAPANNA.

Bentinckia Coddapanna, *Berry MSS. in Roxb. Fl. Ind. l. c. Mart. Palm. l. c.*

Truncus *tenuis, arundinaceus, annulatus,* frondes *pinnatæ* spadix *infra folia erumpens, paniculatim ramosus, rubescens,* flores *parvuli, compage subglumacea, rubentes.* baccæ *purpurascentes, parvulæ.*

The description of this species is here chiefly derived from Prof. Martius and Dr. Wight as well as from portions of leaves and some immature spadices for which I am indebted to the last named author. It is an elegant, slender palm, about twenty feet high. The *trunk* is about an inch in diameter. *Pinnules* linear, two feet or more in length, nearly an inch broad, much acuminate, rigid, closely inserted, generally split at the point into two exceedingly narrow triangular portions, two to four inches long, the fissure often bearing a thread; above about three-keeled, the mid-keel below furnished with paleæ.

Spadices one, or one and a half foot long. *Spathes* membranaceous; the outer being one or two in number, short, truncate, incomplete, longitudinally striate. *Common peduncle* two or three inches long, of violet colour towards the base, *branches* few, each with a membranous broad semi-amplexicaul bract, three or four times divided; of the female simple, generally only with two divisions. Colour of the male spadices scarlet, of the female pale lilac or violaceous. *Spikes* six inches to a span in length, subfastigiate.

Male *flowers* disposed in rather loose spires, immersed in niches, which are at first nearly closed, afterwards opening vertically. In each niche are two, three, or even four flowers, with occasionally a female in those towards the base of the spikes, the upper ones opening first. An ovate-triangular *bract* is situated under the lowermost flower; and a small *bracteole* bearded on the upper margin is situatad on the outer side of the upper ones. *Calyx* about a line long, *sepals* glumaceous, oblong, concave, rather obtuse. *Petals* nearly twice the length of the calyx purplish, ovate, rather acute, valvate. *Stamens* six, included; *filaments* subulate; *anthers* ovate, subcordate. *Rudiment of the Pistillum* subtrigonal, nearly as long as the stamens.

Female flowers. *Perianth* subglumaceous, imbricate, striately-veiny. *Filaments* without anthers. *Ovarium* ovate three-celled. *Style* almost wanting. *Stigmata* three, triangular.

Berry ovato-globose, rather compressed, six or seven lines long, surrounded at the base by the perianth, bearing the stigmata near the base. *Seed* sub-globose, brown, with a rather deep complete furrow, and several other shorter ones. *Testa* obscurely chesnut-coloured, with veins arising from the groove near the embryo, and converging towards the base on the opposite face. *Albumen* solid, horny. *Embryo* basilar, conical, nearly a line long.

Hab.--In mountains, Travancore. *(Roxburgh* and *Wight).* Flowers in June, seeds ripen eight or nine months afterwards. Telinga name, *Codda-panna.*

Obs.—Martius describes the petals of the male flowers as equal in length to the sepals, and the perianth of the female, as similar to that of the male. This last, which attributes a valvate corolla to the female flower, I do not find to be correct, and in the plate quoted, the petals of the male are represented as I have described them.

This Palm was re-introduced during my superintendence of the Honourable Company's Botanic Garden, from Travancore, through the kindness of Dr. Wight and Mr. Thomas the Collector of Tinnevelly.

XIV. SLACKIA.

GENERIC CHARACTER.

SPATHES 2, incomplete, sheathing. FLOWERS monœcious immersed in niches in the same spadix. FEMININE situated below, either solitary or along with a masculine. MASCULINE above in pairs. STAMENS 6, filaments united at the base. OVARY gibbose, 3-celled with one ovule. STIGMATA 3, sessile. DRUPE very oblique. ALBUMEN horny, simply ruminated. EMBRYO basilar.

HABIT.—Shrubby palms of the Malayan Peninsula, resembling *Arecas*, having the leaves pinnately divided, and without any reticulated fibres. SPADICES axillary drooping. SPIKES simple, often two in number, but sometimes more. FLOWERS sub-glumaceous, white. DRUPE blackish purple, obovately oblong.

OBS.—This genus is nearly allied to *Bentinckia*, but differs from it in the spathes and ruminated Albumen. The leaves are likewise pinnately divided. It has the habit of *Geonoma*, from which genus it differs in the connate columnar form of the filaments, and the divaricate cells of the anthers, in the basilar style, and the even albumen.

It is named in honour of the late HENRY SLACK, a botanist of great promise, who was unfortunately cut off from life at an early age.

1. SLACKIA GEONOMÆFORMIS.

TAB. CCXXXIV.

The *stem* is slender, two to four feet high, about half inch in diameter, and distinctly annulate.

Leaves pinnately split, three, or three and a half feet long, and one, or one and half broad, outline linear-oblong: the *sheaths* are striate, and about a span long; the naked base of *petiole* is about a foot long, and scurfy pubescent.

The *pinnules* are a foot or more in length, obliquely acuminate and nearly entire, or obliquely præmorse and eroso-dentate, varying in breadth from half an inch to two inches, with two or more keels according to the breadth; terminal bilobed, lobes broad, eroso-dentate; threads very fine.

Spathes about two, incomplete, leathery membranous, the lower one bicarinate; the upper twice as long, conduplicate, open, interiorly to about its middle, like the spadix covered with brown pubescence. *Spadix* nodding, generally dichotomous, sometimes racemosely branched; a scale-shaped scurfy pubescent acute bract at the base of the divisions. *Spikes* roundish, rather thick, of a spongy aspect, six or ten inches long.

Flowers partly immersed in niches with fimbriate membranaceous margins.

MALE flowers in pairs, tribracteate. *Sepals* three, oblong-concave, striate, sub-coriaceous. *Petals* valvate, ovately-lanceolate, sub-acute, coriaceous. *Stamens* six; *filaments* stoutish, united at the base, upper part inflexed in æstivation; *anthers* large, linear-oblong, two-celled, versatile. *Pollen* one-plicate. *Rudimentary Pistillum* angulately sulcate, conically cylindric, stout, with a discoid three-lobed apex.

FEMALE flowers in the lower part of the spikes, tribracteate. *Sepals* as in the male. *Petals* broad, with a short broad point, imbricate. Six *rudimentary stamens*. *Ovarium* roundish, gibbous on one side, attenuated into a short stout style; with one cell on the gibbous side, containing one appense-pendulous ovule. *Stigmata* three, ovate, small, spreading or recurved.

Fruit spadix elongated, one, or one and a half foot long, presenting at the base the remains of the spathes, nodding; *peduncle* compressed or sub-trigonal. *Fruit* sub-drupaceous, oblong obovate, five and a half to six lines long, four wide, surrounded at the base by the perianth, very oblique, presenting the style on one side near the base. *Seed* erect, obovate roundish; *tegument* membranaceous, inflexed along simple lines, which are visible on the surface of the seed, converging towards the foramen. *Albumen* horny, simply ruminate. *Embryo* basilar.

HAB.—Forests, Ayer Punnus (Rhim) near Malacca, rather common. In flower and fruit in July, Malayan name, *Pinang Rambeh*.

OBS.—It is scarcely distinguishable at first sight from *Areca disticha*, and like it, varies much in the size and shape of the pinnules.

I have placed both this and *Bentinckia* in *Arecinæ*, as the bulk of their affinities seems to me to indicate. I cannot perceive the necessary affinity between any of the genera arranged in Endlicher's *Genera Plantarum* as pinnate-leaved *Borassinæ*, and the true genera of that sub-family.

Stackia geonomæformis Griff.

XV. ARENGA.

(Areng.) *La Billardiere Mem. l' Instit.* 4. *p.* 209. (Martius). *Mart. Progr. p.* 23. *Palm. p.* 193. *t.* 208. *Endl. Fl.* 248. *No.* 1734. Saguerus (vel Gomutus). *Rumph. Hb. Amb.* 1. *p.* 57. *t.* 13. *Roxb. Icones.* 14. *t.* 81. *Fl. Ind.* 3. *p.* 626. Borassus. *Lour. Fl. Cochin. p.* 617. ex. pte. Gomutus. *Spreng. Gen. Pl. p.* 450. *No.* 2222.

GENERIC CHARACTER.

FLOWERS monœcious, generally but not always in different spadices. STAMENS indefinite. OVARY trilocular. BERRY depressed and three-cornered at the apex, imperfectly three-lobed, three-seeded. ALBUMEN even. EMBRYO dorsal.

HABIT.—Handsome arboreous palms flowering only once, seldom with creeping stems. TRUNK ringed, towards the apex surrounded by the scaly bases the petioles. LEAVES pinnate with copious black rigid fibres intermixed with the petioles. PETIOLES sometimes prickly. PINULES linear fasciculate and in several rows, or solitary and in two rows with auriculate or lobed base, and eroded, truncate, dentate or bilobed apex, lower surface white. SPADIX nodding pendulous. SPIKES pendulous often in bundles (fastigiate) like the tail of a horse. FLOWERS large. ANTHERS mucronately apiculate. BERRIES green, round and large. SEED (cohering to the endocarp) often berried. JUICE acid.

1. ARENGA SACCHARIFERA.

TAB. CCXXXV. A.

A. saccharifera. *Labill. Mem. l'Inst. Lam. Enc. Suppt.* 1. *p.* 441. *Mart. Palm. p.* 191. *t.* 108. Saguerus s. Gomutus. *Rumph. Hb. Amb.* 1. *p.* 57. *t.* 13. Saguerus Rumphii. *Roxb.* 3. *p.* 626. Borassus Gomutus. *Lour. fl. coch. p.* 648. Gomutus saccharifer. *Spreng. Syst.* 2. *p.* 624.

Elata, petiolis inermibus, pinnis fasciculatis 4-5 fariis lineari-ensiformibus basi utrinque auriculatis (auricula inferiore longe producta) apice bilob et varie dentatis.

This is a handsome palm, reaching to the height of thirty or forty feet. *Crown* oblong, very dense, of a sombre aspect.

Leaves very large, twenty feet (or more) long, and ten broad, outline oblong-ovate. *Petiole* very stout, channelled at the base, sprinked with blackish scurf.

Pinnules generally fasciculate, four or five farious, the middle ones five feet long, four, or four and a half inches broad, linear-ensiform, coriaceous, dark green above, underneath white, margins with distant spinescent teeth, towards the apex becoming more frequent; apex itself bilobed or bifid, eroso-dentate; base with one, or generally two unequal auricles, of which the lowermost is much the longer.

MALE *spadix* four or five feet long. *Spikes* attenuate at the apex, and there furnished with a few rudimentary or abortive flowers. *Flowers* very numerous, oblong club-shaped, of a rich purple black colour, and a disagreeable smell, of considerable size, often an inch long. *Sepals* three, rounded, broad. *Petals* nearly three times longer, oblong obovate. *Stamens* 00; *filaments* short and slender; *anthers* nearly as long as the petals, aristato-mucronate.

FEMALE-*flowers* solitary, large, about an inch across. *Sepals* three, very broad. *Petals* three, cordato-ovate, coriaceous. *No sterile stamens. Ovarium* shortly obturbinate, three-celled, apex three-lobed, concave in the centre, whence arise three tooth-shaped, triangular, erect *stigmata;* substance thick, fleshy. Down the back of the lobes which are opposite the sepals, runs a slight keel. *Ovula* erect.

Fruit oblong-round, 2 to 2¼ inches long, surrounded at the base by the perianth; apex flat or nearly concave, marked with three lines, running from the backs of the persistent stigmata to the now nearly obsolete lobes; outer substance coriaceous, thick, inner berried-cellular, gelatinous, adhering for the most part to the seeds, abounding in raphides. *Seeds* dull black, convex on the outer, bifacial on the inner face, and attenuate at the base. *Albumen* horny, cartilaginous. *Embryo* so eccentric as to point almost to the junction of the bifacial side.

HAB.—Malacca Province, generally cultivated, but less common in the littoral districts. It is the *Anowe* of the Malays. It succeeds sufficiently well in the H. C. Botanic Gardens, flowering throughout the year.

OBS.—This is one of the handsomest and most useful Malayan Palms. It is very commonly cultivated in the interior, at Malacca in lines of trees recalling to mind the form of gothic arches. The parts chiefly employed for useful purposes are the black fibres forming the rete, the juice, and the young albumen; the former are twisted into ropes or cordage, renowned for its power of resisting wet; the juice is either drank as toddy or made into sugar, which appears to be in great demand. The young albumen preserved in syrup forms one of the well-known preserves of the Straits. Mr. Lewis informs me, that trees that have died after the ripening of the whole crop

Arenga saccharifera

of fruit, which is the natural course, are almost hollow, and particularly adapted for making troughs, spouts or channels for water, and that they last extremely well under ground.

In short it is so valuable a palm, that it early attracted Dr. Roxburgh's attention, who introduced it largely. The natives of Bengal however have never taken to it, prefering the coir of the cocoa-nut, and the toddy and sugar of Phœnix sylvestris. The following are Dr. Roxburgh's words.

"With respect to the various and important uses of this most elegant palm, I have nothing to offer myself, but refer to what Rumphius and Marsden have written on the subject. At the same time, I cannot avoid recommending to every one who possesses lands, particularly such as are low, and near the coasts of india, to extend the cultivation thereof as much as possible. The palm wine itself and the sugar it yields, the black fibres for cables and cordage, and the pith for sago, independent of many other uses, are objects of very great importance, particularly to the first maritime power in the world, which is in a great measure dependent on foreign states for hemp, the chief material of which cordage is made in Europe.

From observations made in the Botanic Garden, well grown, thriving trees produce about six leaves annually, and each leaf yields from eight to sixteen ounces of the clean fibres.

In the same garden are now (1810) many thousand plants, and young trees, some of them above twenty years growth, with trunks as thick as a stout man's body, and from twenty to thirty feet high, exclusive of the foliage. They are in blossom all the year; one of them was lately cut down, and yielded about 150 pounds of good sago meal." *(Rob. op. cit.)*

2. ARENGA WESTERHOUTII.

TABS. CCXXXV. B.C.D.

Petiolis inermibus, pinnis alternis bifariis linearibus basi uni vel ex-auriculatis apice exattenuato truncatis sæpius bilobis et varie dentatis.

The description of this species is derived from an entire specimen of a young palm, procured from Naning by Mr. Westerhout, two male spadices, and several specimens of female flowers and fruits. It is a palm of about the size of the preceding.

Leaves ample, linear-oblong in outline, twenty feet long, ten feet across in the broadest part; *rete* as in *A. saccharifera.*

Pinnules sessile, about five feet in length, three inches broad, alternate or sub-opposite, solitary, bifarious, very spreading with deflexed points, attenuate towards the base; the upper ones alone auriculate at the lower side, coriaceous bright green above, white underneath; and together with the petiole, scurfy towards the base; margins with irregular spinescent teeth; apex præmorse, dentate and erose, sometimes bilobed.

Spadix curved-pendulous. *Spathes* fibrous, coriaceous, often split. *Spikes* about level topped.

MALE *flowers* in pairs, without an interposed rudimentary female, or solitary, with a rudimentary female. *Calyx* cup-shaped. *Petals* oblong, fuscous-purple. *Stamens* numerous; *filaments* short, subulate; *anthers* with mucronate or aristate ends. *Pollen* hispid, with a longitudinal fold.

FEMALE *flowers* solitary, sessile. *Sepals* broad. *Petals* three, cordate, concave, obtusely carinate. *Ovarium* roundish, trigonal, (angles opposite the sepals), depressed at the apex, and there marked with three lines running from the angles to the stigmata, which are three in number, tooth-shaped, and connivent, so as to form a cone.

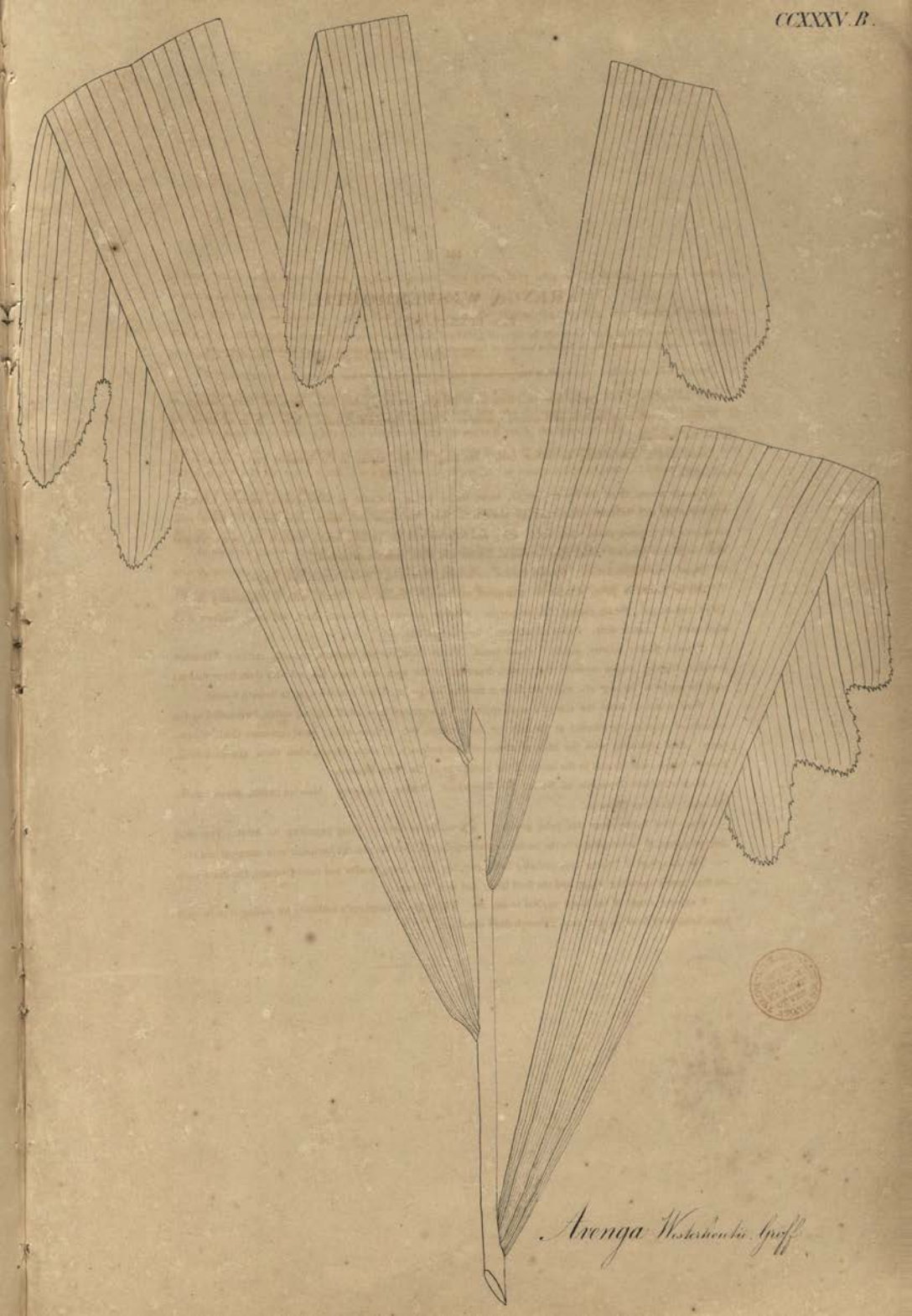
Fruit roundish, about the size of a small apple, with a depressed three-lobed trigonal vertex, terminated by the sphacelated stigmata, surrounded at the base by the perianth, two or three-celled; outer substance thick, fibrous-fleshy. *Seed* separating with the thick gelatinous-cellular endocarp, of black colour; when three, convex-bifacial. *Embryo* oblique, and situated in the centre of the dorsal face of the horny *albumen.*

HAB.—Malacca Peninsula at Naning. *Mr. Westerhout.* Penang. *Mr. Lewis.* Malayan names, *Anoœe kutaree.* (Malacca); *Langkup* (Penang).

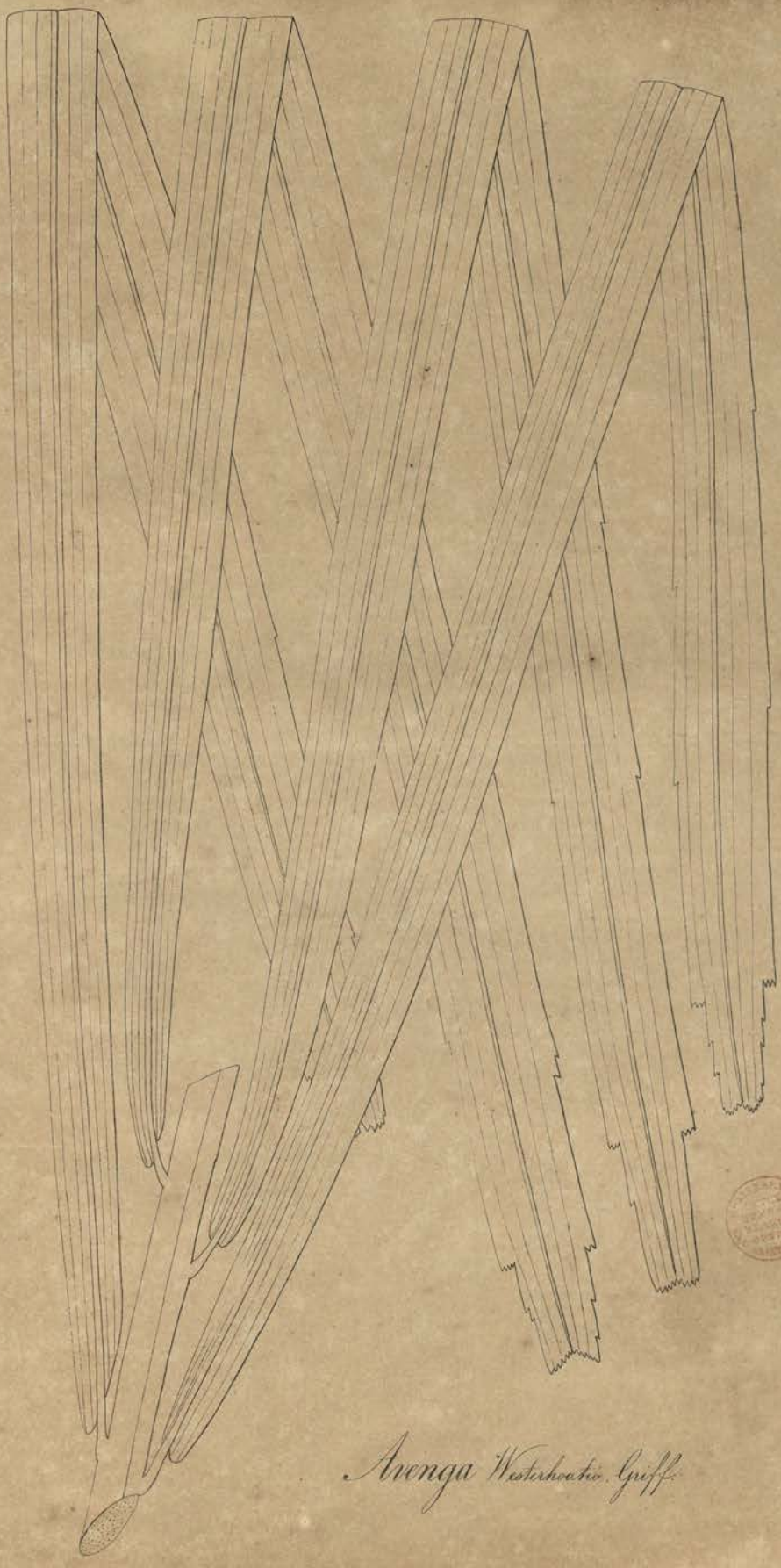
OBS.—Not having seen this palm growing, I am unable to say any thing regarding its habit The chief difference from *A. saccharifera* is in the leaves. *A. obtusifolia*, Bl., has the petioles furnished with marginal aculei.

The *Langkup* of Penang may probably be distinct, the pinnæ being smaller and more truncate, the branches of the fruit spadix spreading, short, and the fruit larger and more oblong.

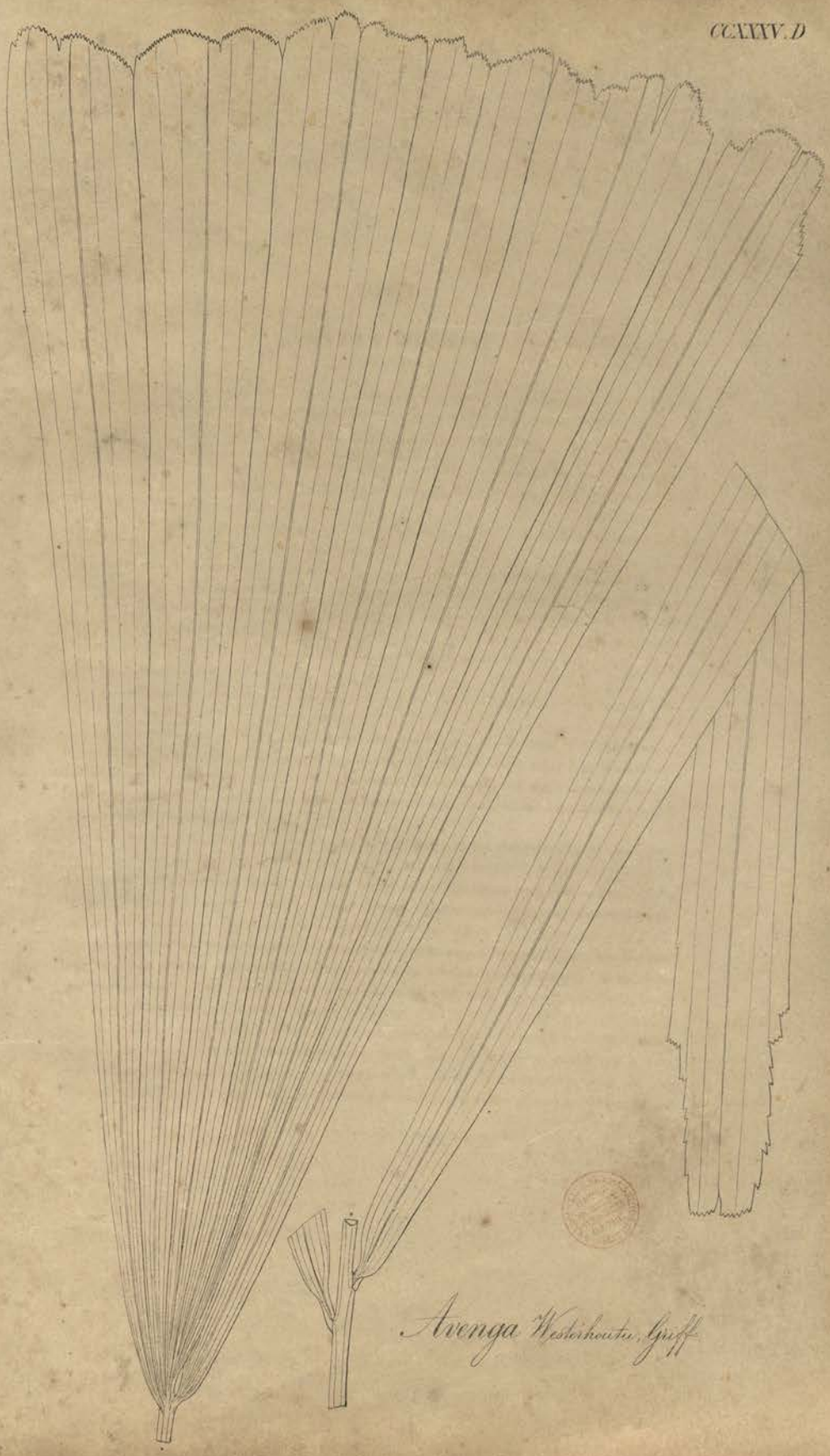
I am not aware of its being applied to any use. I have Mr. Westerhout's authority for stating it to be quite local, being only found in one place, although there abundant.



Arenga Westerhoutii Griff.



Avenga Westerhoatio. Griff.



Arenga Westerhoutii, Griff.

3. ARENGA WIGHTII.

TAB. CCXXXV. E.

Soboliferа, trunco humili 3-8 pedali, petiolis inermibus, pinnis alternis linearibus basi bi-auriculatis (auricula inferiore maxima) apice attenuato erosis inæqualiter bilobis, spadicis ramis sufastigiatis, fl. fœm. staminibus sterilibus pluribus, semine venoso, embryone supra medium.

The description of this species is derived from specimens consisting of portions of a leaf; an entire male, and female fruit spadix, communicated by Dr. Wight, with a letter describing the habit, together with a drawing of the male spadix, male and female flowers, and a fruit-bearing branch.

It is a monœcious palm, forming by means of suckers dense clumps. *Trunk* stout, as thick as man's thigh, generally three to five feet high, rarely eight feet.

Leaves eighteen to twenty-eight feet in length; the lower naked part of the *petiole* is six or eight feet long.

The *pinnules* are alternate, crowded, linear ensiform, three, or three and half feet long, and one and half, to two inches broad, white underneath, with two large auriculæ at the base, the lower of which being very large indeed, $1\frac{1}{2}$ to 2 inches long, obliquely overlying the petiole, with a few distant teeth from the middle upwards; apex attenuate, unequally bi-lobed, erose; the terminal lobe is narrow-cuneate, two, or three-lobed, base shortly bi-auriculate, apex truncate, lobulose, cuneate, and jagged-dentate.

Spadices decurved pendulous, about four feet long: *peduncle* before branching, about two feet long, and quite concealed by the sheathing imbricate lacerate spathes.

MALE; *branches* or spikes about two feet long, sub-fastigiate, slender. A scale-shaped *bract* at the base of each. *Flowers* rather distant, (altogether forming a rather thin mass of inflorescence), rather large, in pairs, with a vertical scale interposed. The *calyx* consists of three roundish imbricate sepals, with thick bases. *Petals* three, oblong, very thick and coriaceous. *Stamens* 00; *filaments* short; *anthers* linear, adnate, terminated by a longish subulate point. No *rudiment* of a *pistillum*.

FEMALE; branches of the *spadix* attenuate towards the ends, where they bear rudimentary flowers. *Flowers* solitary, under each is a shallow entire or bi-lobed cup. *Sepals* broadly cordate, small. *Petals* roundish-cordate, acute or cuspidate. *Abortive stamens* several.* *Ovarium* roundish, three-celled. *Styles* three, short, recurved. *Ovula* solitary. *Fruit* crowded on the lower halves of the stout spikes (the upper halves naked), about the size of a crab-apple.

Seed convex on one face, and unequally bifacial on the other, separating easily except at the base, from the black papery endocarp, brown, surface conspicuously marked with slightly branched veins, converging at the apex of the seed. *Albumen* horny. *Embryo* on one edge of the convex face, above the middle.

HAB.—Dense forests on hills about Coimbatore, *Dr. Wight*.

OBS.—This species approaches in its inflorescence closely to *A. Westerhoutii*. The main differences from it seem to regard the pinnules, which are attenuate and bi-lobed at the apex, (not as in that species undiminished or even wider and more or less truncate, and ex-auriculate at the base), and the seeds. It also disagrees in stature with the foregoing, in which respect it differs from *A. saccharifera*, as it also does in the solitary pinnules and the veiny seeds.

* In flowers shortly after fecundation, however, I find none.

I believe it is the first species hitherto found on the continent of British India; it is dedicated to Dr. Wight its discoverer, to whom Indian Botany is so deeply indebted.*

* I subjoin a short description of another species observed in the second Kiouk-dweng, or mountain defile of the Irawaddy.

Stem stout, 10-15 feet high, covered with the bases of the petioles. *Leaves* 10 feet long; *rete* scanty, stout, with very long, black twig-like processes; *pinnæ* ensiform, 2-2½ feet long, 1½ inch broad, white underneath, bi-auriculately lobed at the base, the lower lobe very large and decurrent. *Spadices* ample, nodding, pendulous.

HABIT.—In densely shaded places of the second Kiouk-dweng, or rocky defile of the Irawaddy in descending that river from Mogaun, 7th May, 1837.

OBS.—This is the most northern species of the genus. In the same locality Orophea, Dillenia, Hæmatospermum, Campanula, and Æsculus, were noticed.

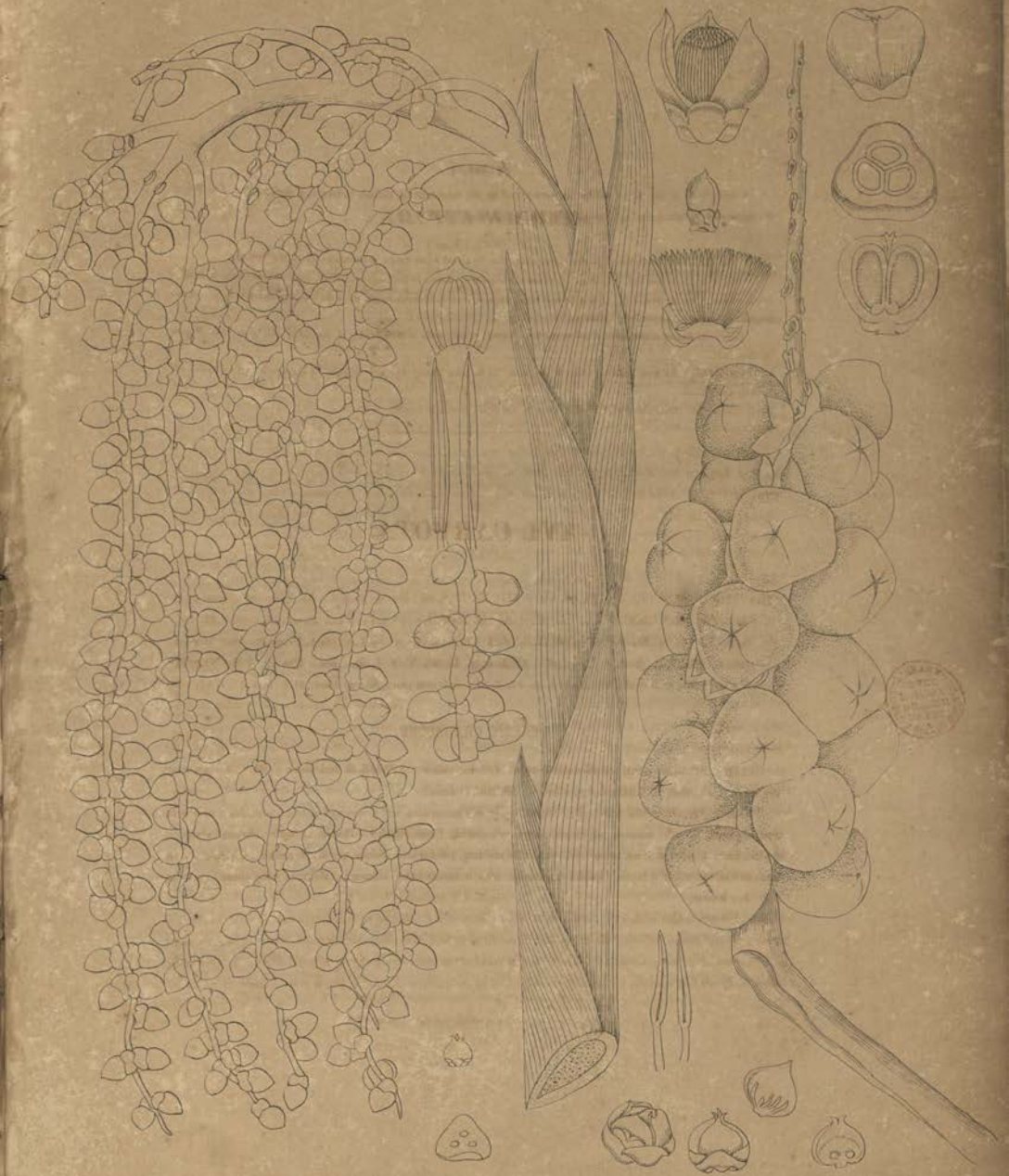
XVI. CARYOTA.

Linn. (Mus. Cliff. p. 12.) *Gen. Pl. ed. 6ta. p.* 517. *No.* 1228. *ed Schreb. p.* 779. *No.* 1701. *ed. Spreng. p.* 449. *No.* 2218. *Juss. Gen. p.* 38. *Gært Sem. et. Fruct.* 1, *p.* 20. *t.* 7. *Roxb. Icones.* 14. *t.* 80. *Fl. Ind.* 3. *p.* 624. *Jacq. Frang. Bot. p.* 20, *t.* 12, *f.* 1. *Lam. Illustr. (t.* 897.) *Mart. Progr. p.* 18. *almae. d.* 193. *t.* 107. 701, (bad). *t.* 162, (bad). *(Tab.* 5, *f.* 1, *tab.* Y, *f.* 1, 2). *Endl. Gen. p.* 248. *No.* 1735. Seguaster Major, *Rumph. Hb. Amb.* 1. *p.* 64. *t.* 14. Schunda-pana, *Rheede Hort. Mal.* 1. *p.* 15. *t.* 11.

GENERIC CHARACTER.

FLOWERS monœcious, one faminine between two masculine. STAMENS indefinite. BERRY somewhat dry, often one-seeded. ALBUMEN ruminated. EMBRYO dorsal.

HABIT.—Elegant palms often lofty, frequenting woody mountains, and flowering but once, sometimes perennial. TRUNK closely ringed. LEAVES bi-pinnate, large, reticulated, fibres slender. PINNULES wedge-shaped, obliquely eroded, on both sides of the same colour. SPADICES nodding, pendulous. SPIKES pendulous, often hanging down in bundles like the tail of a horse. FLOWERS feminine with 3 rudimentary stamens. BERRIES subglobose somewhat red. JUICE sour.



Avenga Wightii. Griff.

1. CARYOTA URENS.

C. urens. *Linn. fl. zeyl. p.* 187. *No.* 396. *Willd. sp. Pl.* 4. *p.* 493. *Gært. fruct. et. sem.* 1. *p.* 20. *t*, 7. *Roxb. Icones.* 14. *t.* 80. *Fl. Ind.* 3. *p.* 625. *Mart. Palm. p.* 193. *t.* 107. *t.* 108, (indifferent), *t.* 162, (very bad). Schunda-pana. *Rheede. Hort. Mal.* 1. *p.* 15. *t.* 11.

Arborea, pinnulis coriaceis spinuloso-dentato-lobatis et erosis, lateralibus obliquissimis margine exteriori producto caudato-acuminatissimis, staminibus sub-38, antheris sæpius emarginatis, baccis depresso-globosis 1-2 spermis globuli sclopeti magnitudine.

The description of this species is taken from specimens in the Botanic Gardens. It is a lofty, and extremely elegant palm. The *trunk* is a foot in diameter, and thirty-five or forty feet high, with distinct distant annuli. The *crown* is rather thin, consisting of several ascending gracefully curved bi-pinnate leaves, of great size, being eighteen or twenty feet long, and ten or twelve broad.

The *petiole* is very stout, at the base measuring about three inches across; the lower foot in its length is naked, and the margins of the sheath continued upon it as an elevated confluent line. *Rete* moderate, and coarsely fibrous.

The pinna or primary *pinnules* are fascicled, or generally alternate, inserted on large knobs, are five or six feet long, curved or even drooping. The lowest secondary *pinnules* are attached to the petiole itself, crowded, broad-cuneate, less obliquely præmorse, and generally not produced on the outer side; but the upper ones gradually assume the form of the other *pinnules*, which is narrow-cuneate with the outer edge caudately acuminate; there are about twenty-two, or twenty-four to each pinna or primary pinnule, twelve or fifteen inches long, and 1½ to 2 inches broad; those of the uppermost pinnæ are very narrow, even so as to be almost equilateral. All are sharply toothed, lobed, and erose, coriaceous, plicate, and green. The *terminal pinnules* are broadly cuneate, two-lobed, or perhaps generally three-lobed.

The *spadices* are very large and long (ten or twelve feet): the upper ones flowering first, and so on, until that next the ground has flowered, when the tree dies. The *peduncle* is curved, stout, entirely covered with large, greyish, coriaceous leathery *spathes*, one, or one and a half foot long, and closely imbricated. *Spikes* very long, pendulous, level-topped, resembling a huge docked horse-tail. *Flowers* immensely numerous, placed in threes, the central and lowermost being female, and later than the others in development.

Male flowers. *Sepals* three, roundish, cordate ciliate, and imbricated. *Petals* oblong, and reddish. *Stamens* thirty-eight, *filaments* short and white, the *anthers* being about as long as the petals, linear, generally with bifid or emarginate points. No *rudiment* of a *pistillum*.

Female flowers much the same, as the male, but the *sepals* are broader, more ciliate, the *corolla* shorter, and of greenish colour. *Sterile stamina* three, placed opposite the sepals and angles of the ovarium, resembling young anthers. *Ovarium* subtrigonal, roundish, bilocular, cells anterior and posterior. The *ovule* solitary, erect. *Stigmata* two, cordate, white. *Berry* reddish, "about the size of a nutmeg, covered with a thin, yellow, acrid bark, but nothing that deserves the name of pulp. *Seed* generally solitary," (Roxb.) "*Albumen* horny. *Embryo* conical, and central." (Martius).

Hab.— In sandy places, Malabar. *(Rheede).* On Hills Cavila-Cutty, with Teak and wild Mango trees, at Velater. Malabar, where it is called *Evim-pannah*, and Dinagepore in Bengal, *Buch. Hamilton.** A native of the

* Journ. Mysore. ect. 3. p. 64.—Ditto 2. p. 454.

various mountainous parts of India, flowering-time the hot and rainy season. *Roxb.*—Assam. Telinga name *Jeroogoo*. The Dianapore name *Ramguoah, Bon-khejur*. Assam, name *Bura flawar*.

Obs.—This and the *Phœnix sylvestris* when allowed to reach their full size unmutilated, are the handsomest and most useful palms of the peninsula of India.

"This tree is highly valuable to the natives of the countries where it grows in plenty. It yields them, during the hot season, an immense quantity of toddy or palm wine. I have been informed that the best trees will yield at the rate of one hundred pints in the twenty-four hours. The pith or farinaceous part of the trunk of old trees, is said to be equal to the best Sago; the natives make it into bread, and boil it into thick gruel; these form a great part of the diet of those people; and during the late famine, they suffered little while those trees lasted. I have reason to believe this substance to be highly nutritious. I have eaten the gruel, and think it fully as palatable as that made of the Sago we get from the Malay countries." *Roxb. op. cit.*

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2. CARYOTA OBTUSA.

Tabs. CCXXXVI. A.B.

Arborea, pinnulis valde inæquilateralibus erosis dentibus brevibus obtusissimis, floribus masculis distantibus, antheris mucronulatis.

The description of this species is taken partly from notes made on the spot, and from dried specimens of a portion of the leaf and a spadix. It is a very large *palm;* the diameter of the *trunk* being one and a half or two feet.

The *leaves* are very large the *pinnules* cuneate, very unequal-sided, coriaceous, when dry remarkably striato-plicate; the outer side scarcely at all produced; the teeth short, and very obtuse.

The *branches* of the male spadix are long, flexuose, and scurfy.

The *flowers* are distant, three together, the central (female) are later in development.

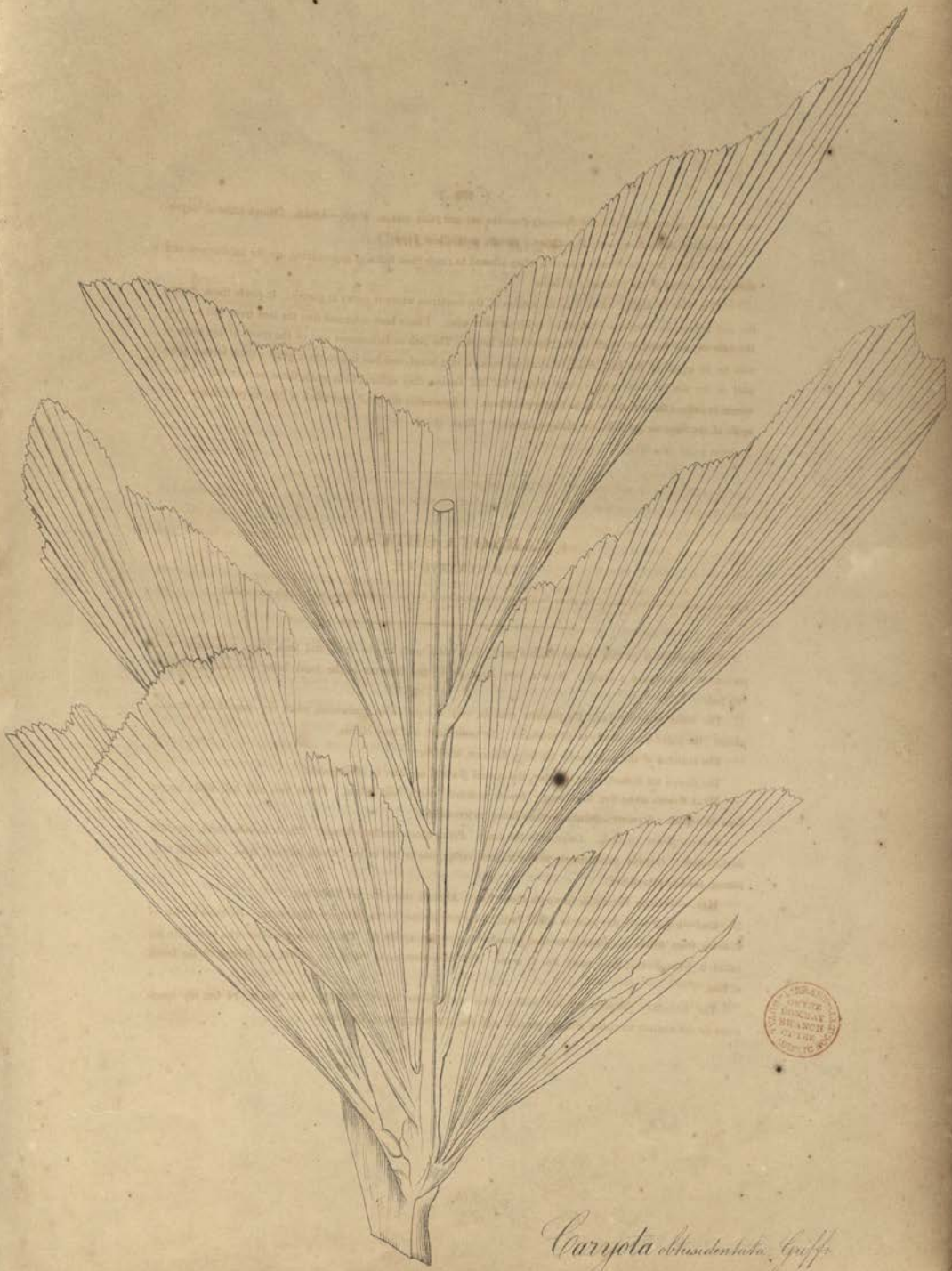
Male flowers about five lines long. *Sepals* rounded, scurfy and ciliate. *Petals* two and half times longer than the sepals. *Stamens* indefinite, *anthers* linear, mucronulate.

Female *flower* (in bud). *Calyx* as in the male. *Petals* much smaller, valvate. *Sterile stamina* three, opposite to the sepals. *Ovarium* sub-turbinate with a trigonal vertex, one or two celled. *Ovula* solitary, erect. *Stigmata* two, oblong, cordate-subreflexed.

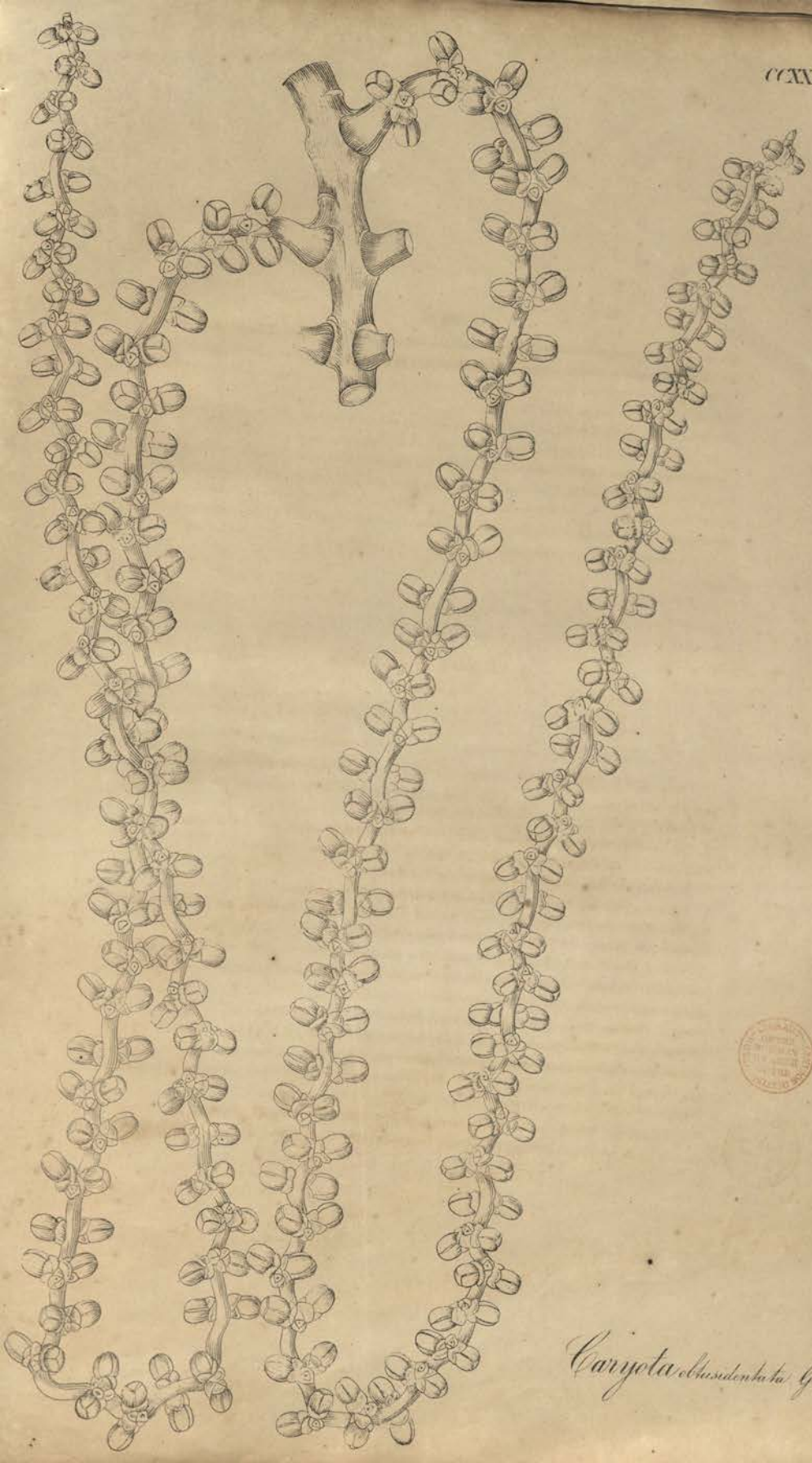
Hab.—Mishmee Mountains in woods about Yen. Altitude above the sea 3,400 feet.

Obs.—I met with this palm in 1837, during a hurried journey to the Mishmee Mountains. Its habit is that of *C. urens*, from which the obtusely toothed pinnules at once distinguish it. The Assamese coolies who were with me called it Bura Suwar, their name for *C. urens*. The Mishmees make use of the central soft portion of the trunk as food.

The secondary pinnules are not unlike those of *Seguaster major*, Rumph. *Hb. Am.* t. 14 but my specimens do not contain an entire primary pinnule with the attaching part of the petiole.



Caryota obtusidentata. Griff.



Caryota obtusidentata Griff.

Caryota sobolifera

I find in my notes mention made of a second species inhabiting the Mishmee Mountains, with the inflorescence of an orange-yellow colour. Attention should also be directed to the "*Semoong-koong*"* of Sikkim, which is probably a species of *Caryota*.

* See Journal of the Agricultural Society of India, vol. 2. p. 323.

3. CARYOTA SOBOLIFERA.

TAB. CCXXXVI. C.

C. sobolifera. *Mart. Palm.* p. 194.

Arbuscula, sobolifera, pinnulis subobtuse erosis et dentatis latere exteriori cuspidato-acuminatis, staminibus circiter 17, antheris mucronulatis, baccis sæpius monospermis depresso-globosis magnitudine globuli sclopetarii minoris.

This is a very elegant *Palm*, forming by its offsets very thick compact tufts. *Stems* twelve to fifteen feet high, and four or five inches in diameter, of greenish colour and distinctly annulate.

Leaves eight or nine feet long, spreading, nodding towards the apex, glaucescent greenish; *petioles* and *sheaths* scurfy downy; *pinnules* (basilar) sub-opposite, (the rest alternate), obcuneato-deltoid, obliquely præmorse, the outer margin acuminate, regularly and rather obtusely jagged.

Spathes concealing the whole peduncle, almost boat-shaped, at length deciduous. *Spikes* very numerous about a foot long, altogether resembling a docked horse-tail, axis or rachis of green colour, and sulcate.

MALE *flowers* very numerous, oblong, flesh-coloured, with reddish points. *Calyx* cup-shaped, sepals broad, imbricate. *Corolla* of three, coriaceous, striate, petals, almost distinct. *Stamens* about seventeen in number; *filaments* united at the base, very short; *anthers* linear, adnate, generally slightly mucronulate. *Pollen* ovato-lanceolate, one or three plicate.

FEMALE *flowers* at the time of expansion of the males, minute, rudimentary, not developed until after the males of the same spadix have fallen off. They are smaller than the males, not always solitary, but sometimes in pairs, or in threes, or solitary with a scar of one male only. *Bracteoles* two, placed right and left. *Sepals* rounded, with a brown intromarginal line, and ciliate edges. *Corolla* twice as long, tripartite to a little below the middle, coriaceous, brown, valvate. *Barren stamens* three, united to the corolla as far as the sinuses of its segments, ends thickened, glandular yellowish. *Ovarium* roundly ovate, with three obtuse angles, one or sometimes two-celled. *Stigma* one, or sometimes two, cordate, channelled down the middle. *Ovules* one or sometimes two according to the stigmata and the cells of the ovary.

Fruit surrounded at the base by the perianth, depressed, rather round, about the size of a small bullet, greenish red, or red, presenting generally at the apex an oblique cordate stigma; *epicarp* brittle, sub-fibrous. *Seed* one. *Albumen* horny, ruminate. *Embryo* situated obliquely above the middle of the albumen.

HAB.—About Malacca and on Pulo Bissar in woody places. Malayan name, *Tookkus*. *Doodoor* of Penang according to *Mr. Lewis*. It was introduced into the Botanic Gardens in 1816 from the Mauritius, where it flowers during the greater part of the year.

OBS.—I can find no distinction between the Malacca and the Botanic Garden specimens, the former, however, were not observed to be soboliferous.*

The substance of the ovarium, the buds and the outer surface of the albumen abound with raphides.

Dr. Martius, *Palmæ l. c.* mentions his having only met with one ovulum, and a simple stigma. I find however, often two stigmata when the ovarium is two-celled; in the other case the stigma is oblique, and the ovarium smaller.

Dr. Martius is to be considered the authority for the species.

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* The figure here given was taken on the spot from the Malacca Tookus, and was marked *Caryota nana*, in case it should prove distinct.

XVII. HARINA.

Harina. *Hæm. Mem. Wern.* 5. *p.* 317. *Spreng. Gen. pl. p.* 792. *No.* 4110. *Mart. Palm. p.* 188. *t.* 136. part mala.) *Endl. Gen. pl. p.* 248. *No.* 1732. *Roxb. Corom. Pl.* 3. *t.* 295. (1819 Sprengel.) *Mart. Progr. p.* 17. *Reichenb. Consp. Reg. Veg. p.* 72. *No.* 1647. *Bartl. Ord. Nat. p.* 65. *Spreng. Gen. pl. p.* 285. *No.* 1476. *Lindl. Int. Nat. Ord. p.* 346—non D. C. nec Reinwdt. Orania. *Blume. Mari. Palm. p.* 186. *t.* 157. *Endl. Gen. pl. p.* 248. *No.* 1731. *B. Rumphia. t.* 85. Seguaster minor. *Rumph. Hb. Amb.* 1. *t.* 15.

GENERIC CHARACTER.

FLOWERS monœcio-dioœcious, MASCULINE in pairs, STAMENS 6 or indefinite. FÆMININE solitary, or with a masculine. BERRY somewhat dry, 1 or 2-seeded. ALBUMEN even. EMBRYO dorsal.

HABIT.—Low spreading shrubby PALMS, flowering but once, with reed-like TRUNKS, sometimes creeping, (SOBOLIFEROUS). LEAVES pinnate, and furnished with net-like fibres. The lower PINNULES, often fasciculate, the superior solitary, wedge-shaped from the base, entire, variously and dentately lobed, the dentate lobes being spinosely eroded and striated; below, whitish with black dots. FLOWERS monœciously dioœcious or polygamous in different spadices, or monœcious on the same spadix.

MASCULINE. SPADIX axillary, nodding, pendulous, with branched spikes included for the most part within the spathes, or sometimes (particularly in one section of the genus—*Orania*, terminal) with few branches and the spikes exserted, the lower flowers are disposed in pairs, with, or without rundimentary female ones. The upper flowers are solitary.

FEMININE. SPADIX terminal, branches few, exserted, sometimes simple. SPIKES attenuated at the apex, polygamous. FLOWERS solitary, bi-tri-bracteolate. Fruit oblong sometimes oblique, of red or white colour. JUICE caustic.

The genus is subdivided into two sections as follows.

SECTION I.

FLOWERS monœcious. STAMENS 6.

1. *Harina caryotoides* Roxb.
2. „ *oblongifolia* Griff.

SECTION II. ORANIA. Blume.

FLOWERS dioœcious. STAMENS indefinite.

3. *Harina nana* Griff.

HARINA CARYOTOIDES.

TAB. CCXXXVII.

H. caryotoides. *Roxb. Corom. pl.* 3. *t.* 295. Wrightea caryotoides. *Roxb. Icon.* 14. t. 78. *Fl. Ind.* 3. *p.* 621. Harina caryotoides. *Ham. in Mem. Wern. Soc. p.* 317. *Mart. Palm. p.* 188. (excl. syn. Hamilt.) t. 136, (mal.)

Pinnis inferioribus 3-4-natim fasciculatis cuneatis panduriformi-lobatis apice ambitu triangularibus, floribus fœmineis distantibus tribracteatis, alabastris rotundo-conicis, petalis tribus acutis erectis ovario subduplo longioribus.

This is an elegant tufted palm, each tuft consisting of several very short stems.

Leaves ascending curved, eight or nine feet long, two and half feet broad, oblong in outline. *Petiole* naked and roundish throughout the lower four feet, among the pinnules it is bifacial on the upper side, and sprinkled with brown and grey scurf.

Pinnules lowermost disposed in threes, sometimes in fours, the intermediate ones in pairs, and the uppermost solitary, cuneate, twelve to eighteen inches long, and six or seven broad, coriaceous, with a deep notch corresponding on either side towards the middle, and a shallower one at the apex on either side of the midvein: the margins of these are lobed and erose, teethe lose set, almost spinous; the *terminal* pinnule cuneate, bilobed at the apex, sides above the middle lobed, and similarly erose-dentate.

MALE *spadix* not seen.*

FEMALE *spadix* terminal, shorter than the leaves, erect, or almost nodding. *Spathes* closely imbricated, concealing the peduncle. *Spikes* spreading, stout, marked under each flower with a distinct areola, with attenuate points, bearing *neuter* flowers, which are cylindrical, with six barren stamina and no pistillum.

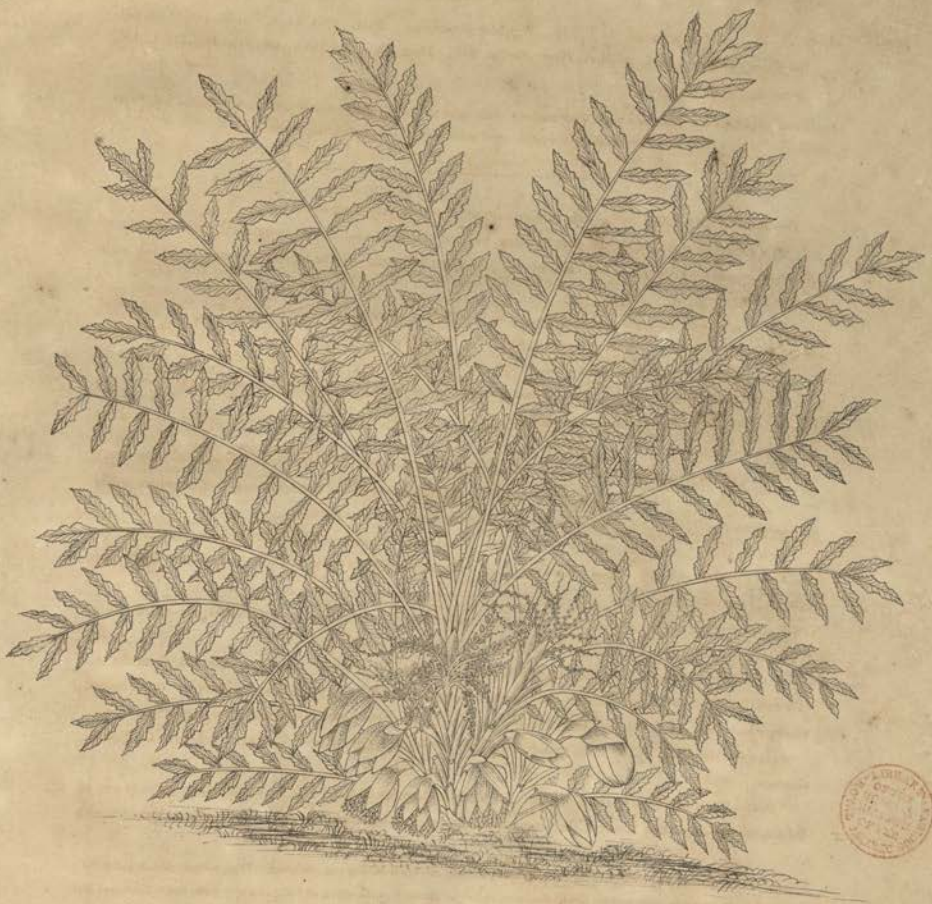
Next to these, occur some nearly if not quite *hermaphrodite*, with generally three full sized stamens, and seemingly a well developed Pistillum. The other flowers are *female*, and are in the bud roundly conical. *Sepals* three short and rounded. *Petals* three, ovately cordate, erect, acute, almost spinously pointed, about twice as long as the calyx, and ovarium, of greenish colour. No rudiments of *Stamens*. *Ovarium* roundly turbinate, two-celled, with a very short conical *style* and an emarginate *stigma*. *Ovules* solitary, ascending.

Fruit oblong, about half an inch long, reddish, with a thin coat of flesh. *Seeds* generally two, about the size of a coffee-seed, plano-convex, with an indistinctly reticulate-veined surface; *tegument* adhering to the *albumen*, which is horny and solid. *Embryo* conical, and placed a little above the centre of the convex or dorsal face.

HAB.—Chittagong, where it is called *Chilputta* or *Belputta*, (Roxb.) Cultivated in the H. C. Botanic Gardens.

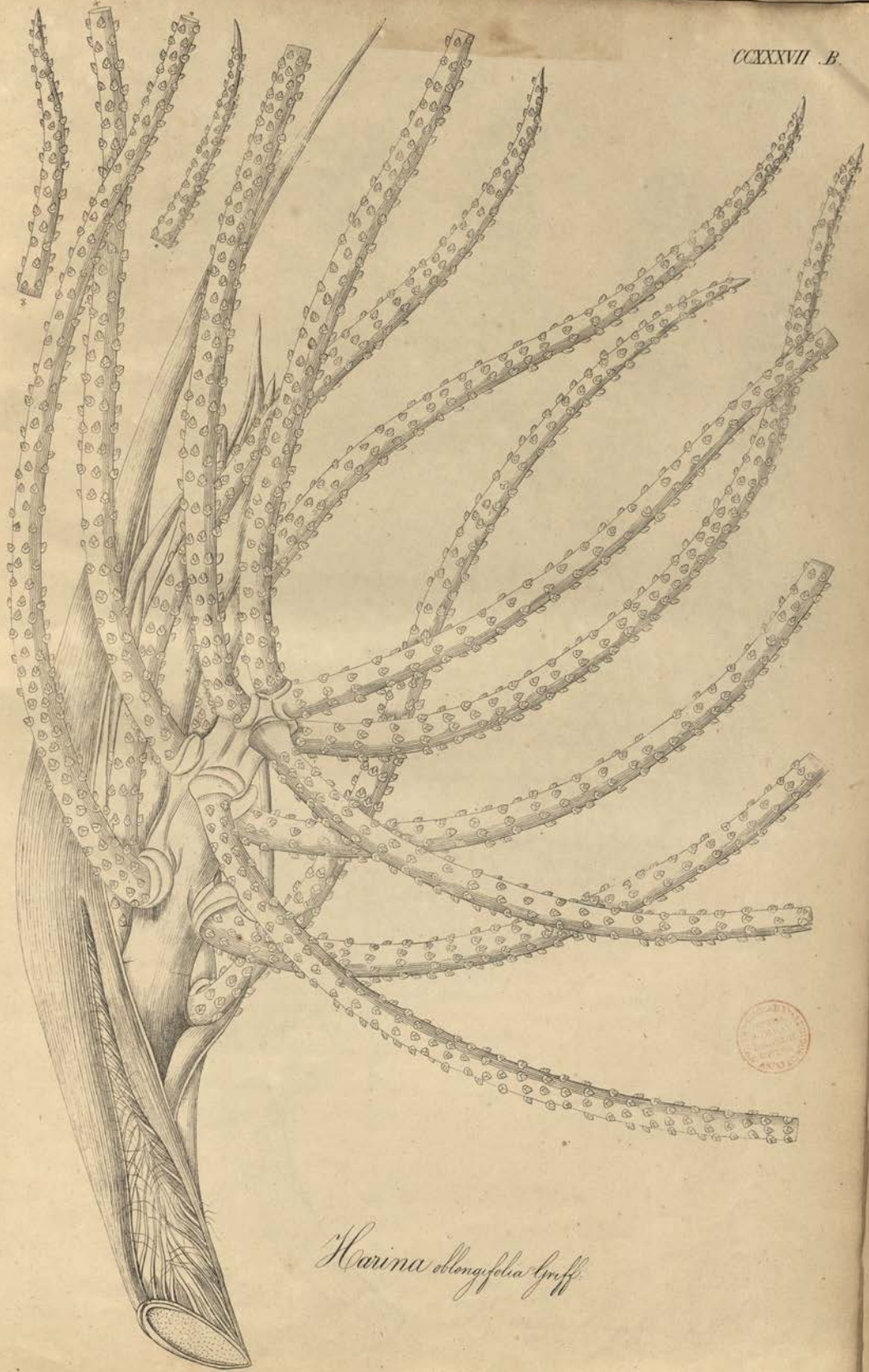
OBS.—This I believe is Roxburgh's plant, the pinnules agreeing in shape with the outline figure given in one of his original drawings. Still however, there are many discrepancies, Roxburgh representing the spadix as terminal, with

* Roxburgh's drawing represents the spadix terminal, nodding, the flower-bearing part pendulous. The spathes acuminate, not entirely appressed to the peduncle, those next the flowers distichous, and rather shorter than the spikes, all being of a grey-green tint. The leaves next the inflorescence have the pinnules almost truncate, with one or two notches above the middle, the lowermost being in pairs.

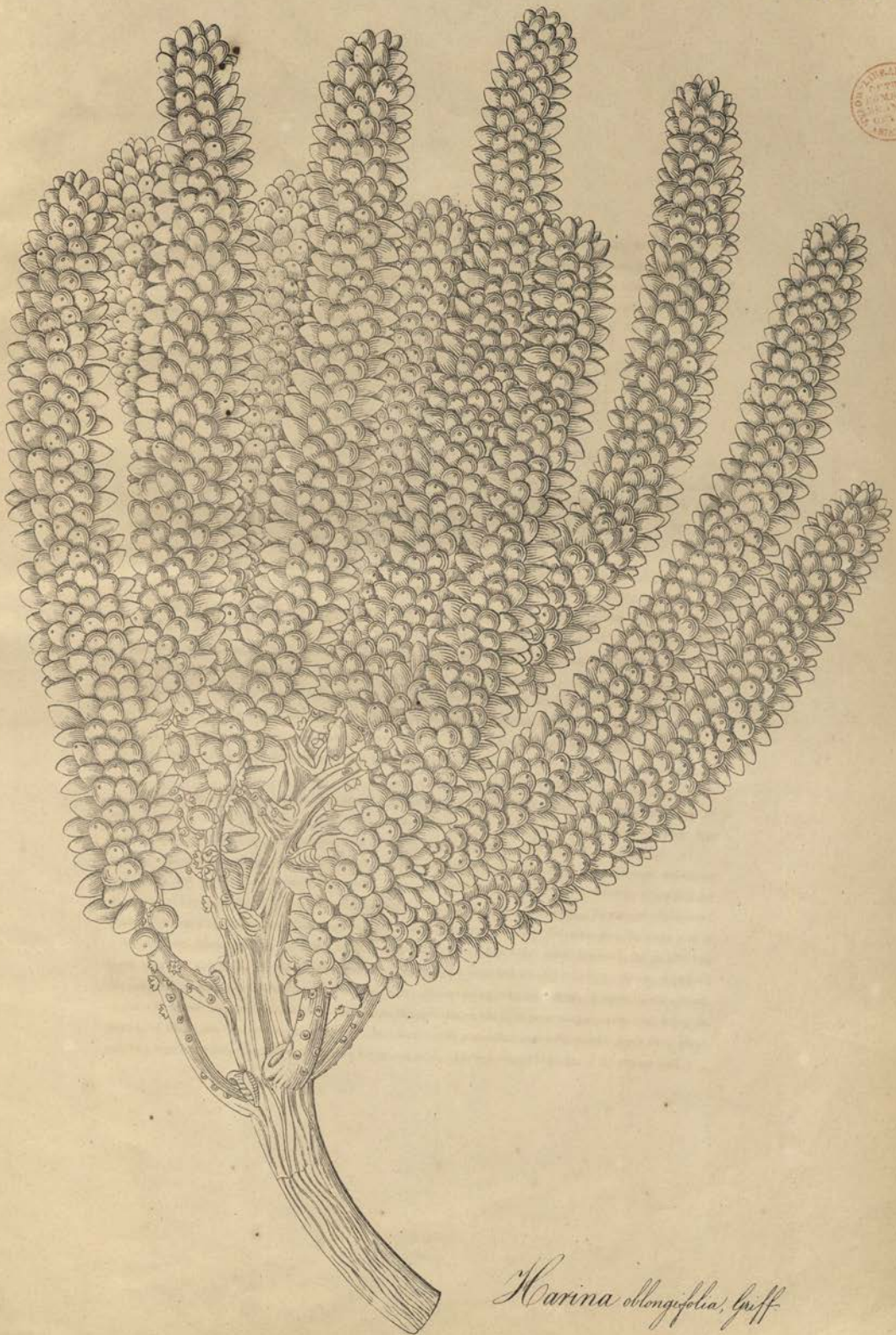


Harina caryotoides

Harina oblongifolia.



Harina oblongifolia Griff.



Harina oblongifolia, Griff.

both male and female flowers, and resembling in most respects the male spadix of the succeeding, whereas the garden plants are as I have described them, their spadices evidently corresponding to the female spadices of the succeeding.

Buchanan Hamilton's plant, which he considered the same as Roxburgh's, appears to me from his description distinct. I have therefore quoted his synonyme doubtfully.

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2. HARINA OBLONGIFOLIA.

Harina caryotoides. H. B. C. non Roxb. H. densiflora, *Mart. Palm. p.* 189.

Pinnis imis binatim fasciculatis (reliquis solitariis) lineari-oblongis basi breviter cuneatis integerrimis cæterum sinuoso-lobatis dentatisque ut plurimum eroso-serratis obtuse acuminatis, spathis (spad. masculi) ventricosis spadicem e maxima parte obeludentibus, floribus fœmineis densis bibracteatis, corolla tridentata quam ovarium breviore segmentis depressis.

This is a very elegant Palm forming thicker tufts than the preceding, but the *leaves* are rather larger, and the lower ones are spreading; the *petiole* is much the same as that of the preceding.

Pinnules alternate or often sub-opposite, the lowermost only in pairs, linear oblong, eighteen or twenty inches long and four broad, from a short entire cuneate base sinuato-lobate and dentate, undulated, eroso-dentate almost throughout, white beneath, with a brown midrib, the terminal pinnules are broadly cuneate, three-lobed, the central lobe being itself bi-lobed, and similarly eroso-dentate.

Male *spadices* axillary, curved, often nutant or pendulous; the ends of the lowermost touching the ground, scarcely more than one and a half foot in length. *Spathes* densely imbricated, the innermost almost membranous, striate, tinged with dark purple, equalling the flower-bearing part of the spadix, and often disposed round it in an urceolate form. *Spikes* slender, very numerous, level-topped, pendulous, their points projecting beyond the opening of the spathes.

Flowers very numerous, ochroleucous, the lower ones in pairs, with a rudimentary female between; the upper ones solitary. *Calyx* cylindrical, nearly entire. *Corolla* as long as the calyx, tripartite nearly to the base, segments reflexed. *Stamens* six; *filaments* cohering rather high up to the petals. No *rudiment* of a *Pistillum*.

Female *spadix* much like that of the preceding species; *spathes* brown, conduplicate, the outer one sometimes very long, and acuminate. *Branches* very stout, green, variously ascending, tapered at the ends, where they are caudiform and notched, the notches bearing rudimentary flowers. *Bracts* two, right and left. *Flowers* purplish, closer than in the preceding species, sometimes (especially in the wild specimens) quite crowded, occupying the lower part of a flattish areola, bases somewhat immersed; in the bud almost globose. *Calyx* very short, divided to the middle into three broad rounded teeth. *Corolla* shorter than the ovarium, trifid, segments broadly half ovate, obtuse, depressed. No rudiments of *stamens*. *Ovarium* round ovate, two-celled. *Stigma* an indistinctly emarginate point. *Ovule* solitary.

Fruit crowded, oblong, surrounded at the base by the perianth, on the apex presenting a brown spot, being the remains of the stigma; *epicarp* tough, rather thin; flesh scanty, with a mucilaginous acrid juice. *Seeds* two, plano-convex; *tegument* greenish and veiny. *Albumen* horny and solid. *Embryo* about the centre of the convex face.

HAB.—Assam. *Major Jenkins, Mr. Masters.* Sub-Himalyan range. Darjeling. Cultivated in the H. C. Botanic Gardens, flowering in May and June.

OBS.—This species is quite distinct from the first, though at first sight they are scarcely distinguishable from each other. The main differences are the linear-oblong, sinuate-lobed or toothed, obtusely acuminate pinnules,—the lowermost only occurring in pairs—the male spadices, which are, judging from Roxburgh's figure, quite different—the shape of the flower bud, and the trifid corolla with depressed segments which are shorter than the ovarium.

It is more common in the Botanic Garden than *Harina caryotoides*, for which it has been mistaken.

---

3. HARINA NANA.

TAB. CCXXVIII.

Pinnis subquinis oppositis basi cuneatis ceterum obliquis irregulariter lobatis vel dentatis, spathis vaginantibus distichis conduplicatis, fl. fœmineis tripetalis ferrugineo-furfuraceis, spadicibus (fœm.) simplicibus vel 2-3 ramosis, fructibus oblongis 1-spermis (albis).

The description of this species is derived from fresh specimens of the entire plant communicated by major Jenkins. This is a small erect palm, from three to five in height. The *trunk* is slender, throwing out roots from the base, and covered with the sheaths of the leaves.

The *leaves* are about two feet long; the *petiole* short, roundish, obliquely sheathing at the base, with a thin *rete*, above produced into a bipartite liguliform body; the *pinnules* are alternate or sub-opposite, cuneate towards the base, above this oblique, variously lobed, toothed and spinuloso-serrate: the terminal one irregular in shape generally bilobed, striately veined, above green, underneath glaucous white.

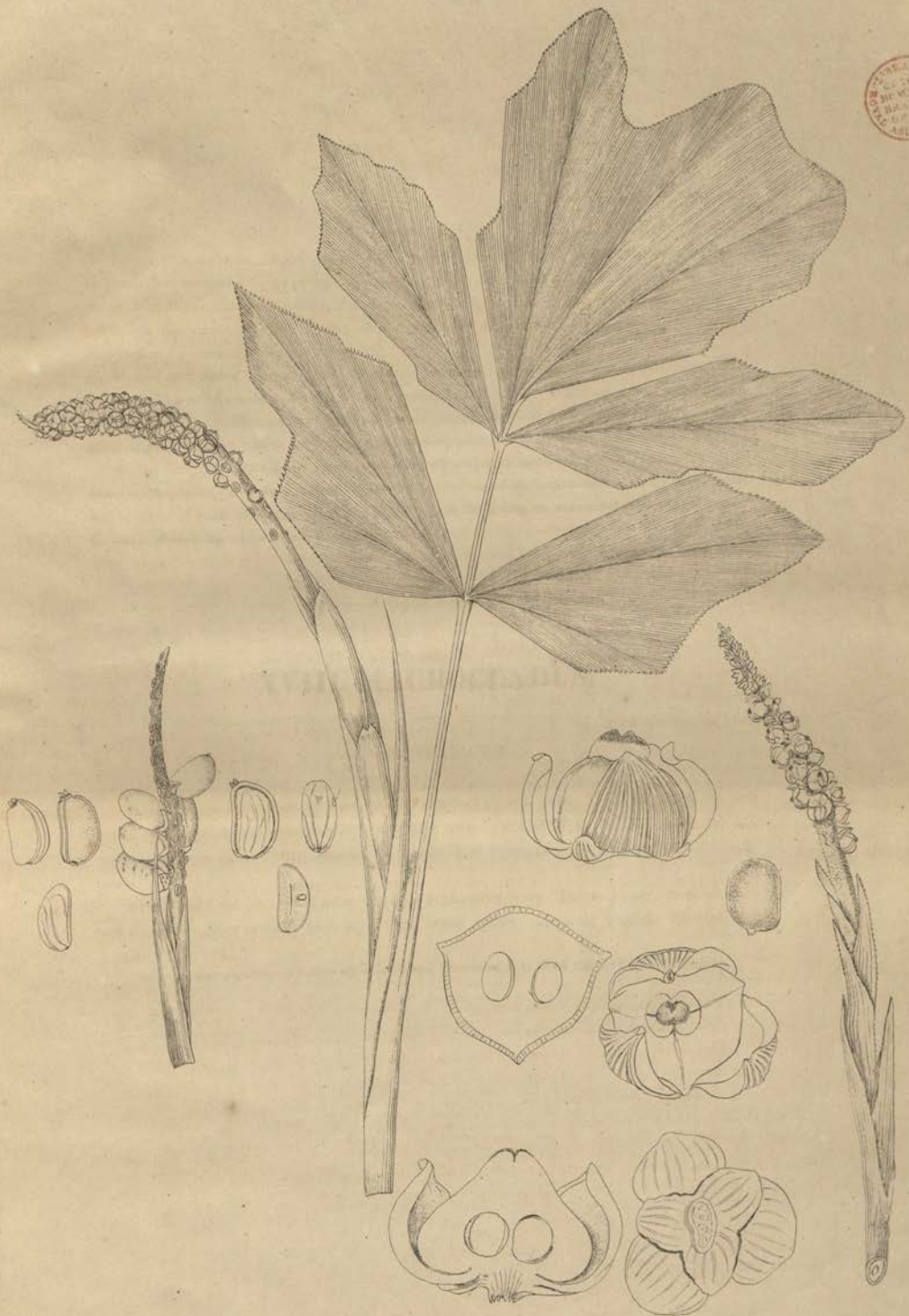
Spadices axillary. *Spathes* several, distichously imbricate, ferrugineo-furfuraceous, conduplicate, entirely concealing the peduncle.

Spadix simple, or with two or three divisions, densely ferrugineo-furfuraceous, the flower-bearing part exserted, about the length of a finger. *Flowers* densely spiked, small, white, with (at least in the female), an inverted order of expansion.

MALE. *Calyx* composed of three rounded sub-membranous sepals. *Petals* three, oblong, with almost introflexed points, furrowed inside from the pressure of the stamens. *Stamens* about fourteen, inserted on a small prominent torus, rather shorter than the petals; *filaments* very short; *anthers* linear, adnate. No rudiment of a *Pistillum*.

FEMALE. *Flowers* also white, crowded on a generally simple spadix, attenuate at the apex and probably there bearing neuter or hermaphrodite flowers. *Calyx* tripartite nearly to the base, segments very spreading, greenish. *Corolla* composed of three broad, ovate, sub-connivent striate, coriaceous petals. No rudiments of *stamina*. *Ovarium* white or reddish, a little shorter than the corolla, triangular-conical, the angles alternating with the petals, two-celled, of a thick coriaceous substance. *Style* none. *Stigma* emarginate. *Ovules* solitary, erect.

Harina nana Griff.



Harina nana (Griff)

Fruit sub-baccate, white, obliquely oblong, straight on the upper side, convex on the other, seven lines long, 4¼ broad; base surrounded by the perianth, apex presenting a bi-dentate sphacelated stigma, one-seeded, two celled, one-cell being almost obliterated. *Seed* one, of the same shape, whitish; *tegument* adhering to the albumen; *raphe* on the straight face, palmately divided, branches often dichotomous. *Albumen* solid, radiating from a central line. *Embryo* about the centre of the convex (dorsal) face.

HAB.—Lower Assam, in woods about Gowahatty. *Assam Major Jenkins.* Flowers in July, August.

OBS.—This species appears to be allied to *Orania regalis*, Blume, *Rumphia*, t. 85. and *Orania porphyrocarpa*, Mart. *Palm. t.* 157. It differs from both in the number and the irregular shape of the pinnules, the crowded flowers. and three petalled females. In the shape of the fruit it is nearly intermediate.

Besides these three species, I have bits of three others, collected on the north-east frontier, (one from Yen in the Mishmee Mountains). If to these Buchanan's *Harina caryotoides* be added, the total number of our Indian species will be seven of which increase, the most unexpected part is the finding an undescribed species in the Botanic Garden, in which it has existed at least twenty-five years.

XVIII. MACROCLADUS.

GENERIC CHARACTER.

FLOWERS monœcious, MASCULINE and FEMININE sometimes placed in pairs. SPATHES double, the inner one complete, clavately fusiform and woody. COROLLA valvate. STAMENS 6. OVARY three-celled, cells with one ovule in each. FRUIT somewhat dry. ALBUMEN cartilaginous and even. EMBRYO laterally placed.

HABIT.—Lofty Malayan unarmed palms, with dense hæmispherical crown. LEAVES pinnate; PINNULES linear with the apex irregularly toothed or lobed, below white. SPADIX axillary, paniculately branched. FLOWERS white minute.

OBS.—The leaves and female flowers are as in *Arenga*, the spathes as in *Cocos* and the fruit as in *Corypha*.

1. MACROCLADUS SYLVICOLA.

TABS. CCXXXIX. A.B.

This is a handsome palm, about forty feet in height, with somewhat the habit of *Cocos nucifera*. *Crown* subhemisphærical, dense.

Leaves pinnate, ample, twelve to fifteen feet long, spreading in every direction.

Petiole with the margins of the hardened leathery half stem-clasping base, lacerate-fibrous, the lower naked part about five feet long. *Lamina* subobovate in outline.

Pinnules sub-linear, 2½ to 3 feet long, two inches broad, oblique at the points where they are irregularly toothed or lobed, underneath whitish-scurfy: above one-keeled, underneath with five small keels.

Spathes two, the outer one very small, incomplete, two-edged, perforated at the apex, and leathery; the inner one complete, almost woody, before dehiscence fuciform-clavate with a subulate cuspis, striate or sulcate, ferruginously scurfy, roughish, opening longitudinally, the margins becoming reflexed.

Spadix paniculately branched, spreading, nodding towards the point, here and there ferruginously scurfy; *branches* sub-secund, the primary ones suffulted by a broad short greenish *bract*; the secondary *(spikes)* nodding, slender, gradually attenuated to the apex, the lower ones bearing female flowers towards the base, the upper male flowers throughout.

Flowers distichous, white.

MALE. *Flowers* one on either side of the female without a female or in pairs, oblong, sub-angular. *Calyx* small, tripartite to the middle; divisions tooth-shaped, erect, fleshy, membranous. *Petals* three, oblong, coriaceous, boat-shaped, valvate. *Stamens* six, shorter than the petals; *filaments* stout, subulate; *anthers* linear-oblong, adnate, extrose attached near the base. *Pollen* lanceolate, one-plicate, whitish, *Rudiment* of the *Pistillum* simple, conical.

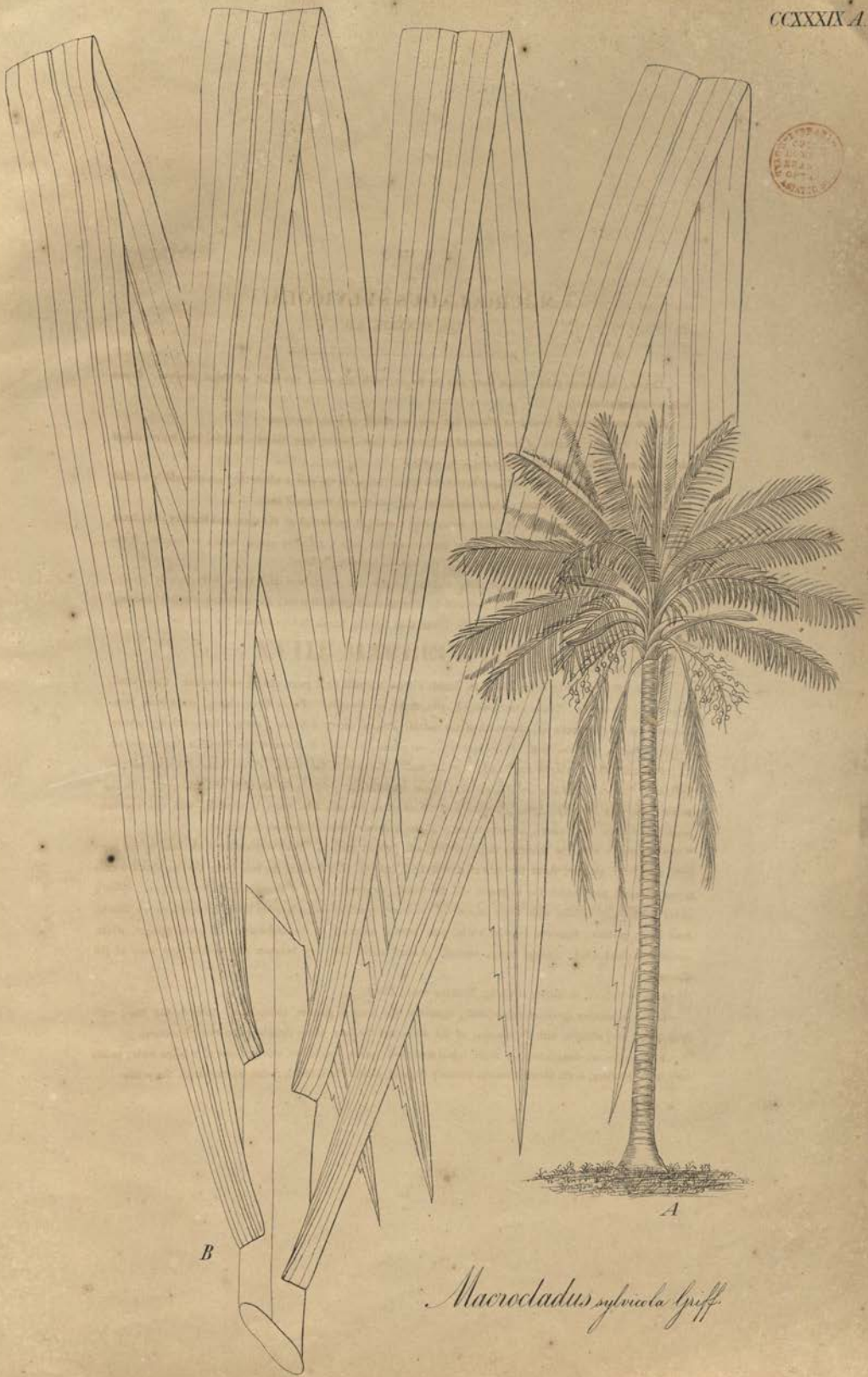
FEMALE. *Flowers* shorter and broader than the male. *Calyx* as in the male. *Petals* broadly ovate, obtuse, spreading, valvate. *Rudimentary stamens* six; those opposite the petals quite abortive and falling off with the petals. *Ovarium* obtusely trigonal, longitudinally three-lobed, to each lobe there is one-cell, with one appense pendulous *ovulum*. *Style* none; *stigmata* three, papillose, recurved, channelled down the centre.

Fruit-spadix with the branches more nodding, and without spathes. *Fruit* surrounded at the base by the perianth, nearly dry, globose, about the size of a small lime, oblique, bi-gibbous at the base (from the two abortive cells of the ovarium near which the stigmata will be found), one-seeded, with a smooth cartilaginous aspect; *epicarp* rather thick fleshy cellular with fibres intermixed: *endocarp* crustæceous moderately thick, hardened, rather brittle. *Seed* large, globose; *tegument* cellular coriaceous, brown, adhering to the endocarp. *Albumen* opaque, white, cartilaginous and solid. *Embryo* large, conical, situated about half way between the middle and base of the albumen.

HAB.—Malacca, in forests at Ching, Malayan name, *Ebool*.

OBS.—In another specimen subsequently examined the fruit is globose, subturbinate towards the base, subdrupaceous, very oblique, with the remains of the style near the base, where there are also two gibbosities.

FEMALE flowers distichous, on stout sub-compressed spikes, on either side is a scar of a fallen male; petals very thick, leathery, ovate obtuse ovarium obtusely trigonal, almost three-lobed, rather shorters than the petals.



Macrocladus sylvicola Griff.

Sepals, minute broad-cordate, acute much smaller than the petals, fleshy, and the lower half united with the torus.

MALE flower on the lower part of the spikes, oblong, angular. Calyx short, cup-shaped, three-toothed. Petals three or four times longer, linear oblong, stamens inserted on a torus occupying the fundus of the calyx, free, about opposite the base of the teeth, filaments short, anthers linear extrorse emarginate, attached near the base. No rudimentary Pistill.

SUPPLEMENT.

COCOS FLEXUOSA. Spadix. Tab. CCXLI.

PTYCHOSPERMA APPENDICULATA. Bl. Tabs. CCXLII. A.B.

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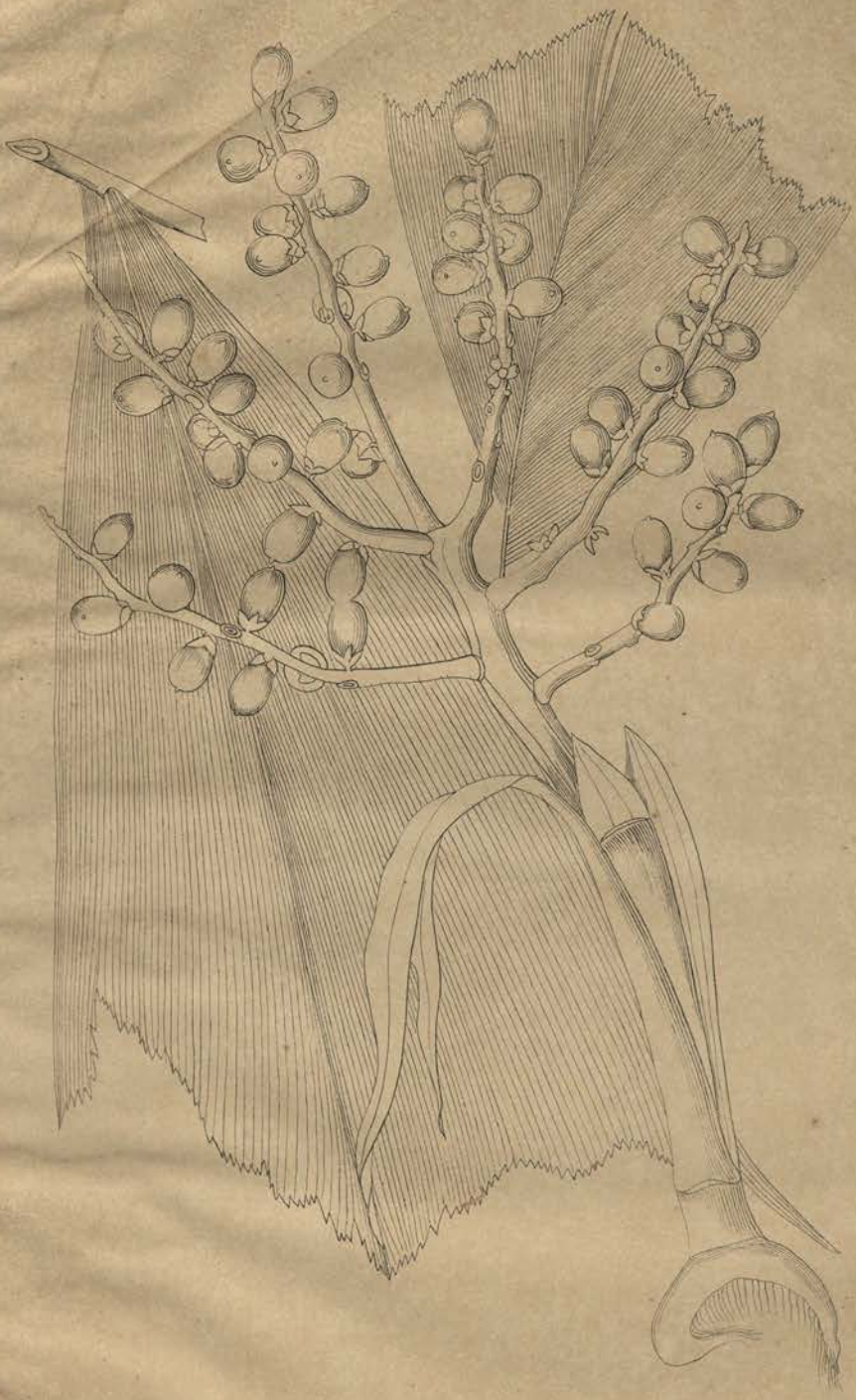
Cocos flexuosa



Ptychosperma appendiculata. Bl.

Ptychosperma

APPENDIX.

PALMIDÆ.

DIAGNOSIS.—*Truncus* lignosus, cylindricus, sæpissime simplex. *Folia* vernatione plicata, coriacea, flabelliformia vel pinnata. *Flores* monoici, dioici, vel polygami, rarius hermaphroditi. *Perianthium* duplex, utrumque triphyllum. *Stamina* hypogyna, sæpius six, rarius indefinita, rarissime tria. *Ovarium* unicum, liberum, triloculare (raro 1-2-loculare), aut tria unilocularia. *Ovula* sæpissime solitaria, erecta, anatropa. *Fructus* solitarius vel triplex, baccatus vel drupaceus sæpius monospermus. *Albumen* corneum vel cartilagineum, solidum vel centro cavum æquabile vel plus minus ruminatum. *Embryo* monocotyledoneus, teres vel trochlearis, in foveola peripherica situs, plus minus vagus.

DESCRIPTIO.—*Flores* monoici vel dioici, vel polygamo-monoici dioicive, rarius hermaphroditi.

Perianthium plus minus coriaceum, glumaceum, rarius coloratum, persistens. *Calyx* trisepalus, sepalis distinctis vel plus minus coalitis. *Corolla* tripetala, petala sepalis subsimilia, distincta vel plus minus coalita, æstivatione sæpius valvata.

Stamina hypogyna, vel ob cohæsionem cum corolla quasi perigyna, sæpissime six, quorum tria sepalis, tria petalis opposita, rarissime tria et tunc sepalis opposita, in paucis indefinita, floris fœminei sæpius rudimentaria. *Filamenta* sæpe basi monadelpha. *Antheræ* introrsæ, biloculares, longitudinaliter dehiscentes. *Pollen* ellipticum v. ell psoideo-sphæricum, longitudinaliter rimatum, interdum echinulatum.

Pistillum liberum, sæpissime tricarpellare: carpella plus minus coalita, floris masculi rudimentaria. *Ovarium* unicum et sæpissime triloculare, aut tria unilocularia. *Ovula* sæpissime solitaria, anatropa, ascendentia. *Styli* tot quot carpella, (interdum deficientes), plus minus coaliti. *Stigmata* simplicia.

Fructus baccatus vel fibroso-drupaceus, interdum trilobus, solitarius, et sæpissime unilocularis, vel carpellis tribus fecundatis ternatus vel triplex, in tribu una squamis retrorsis loricatus, in altera putamine triporoso præditus. *Semen* sæpius solitarium, erectum.

Albumen copiosum, cartilagineum vel corneum, ruminatum vel superficie foveolatum vel excavatum, solidum vel centro cavum.

Embryo in lectulo proprio albuminis inclusus, sæpius ab umbilico remotus dorsalis et pappilla indicatus, teres v. trochlearis. *Plumula* inclusa ægre conspicua, extremitate cotyledonea germinatione aucta et cavitatem, præexistentem vel liquefactione medii albuminis formatam, replente.

Plantae lignescentes, perennes, haud raro monocarpicæ, gemma terminali crescentes.

Radix palaris, mox evanida: radiculæ plurimæ cylindricæ, simplices v. ramosæ, fibrillosæ, in molem conicam sæpe exparte hypogæam dense compactæ.

Truncus arboreus, simplex, rarissime dichotomus, sæpe scandens, nudus et annulatus, vel basibus dilatatis semivaginantibus petiolorum earumve vaginarum cicatricibus scaber: in Nipa rhizoma. *Folia* sæpius in coronam terminalem conferta, in scandentibus distantia; *vaginae* sæpe in reticulum quasi solutæ, cum petiolo sæpe armatæ; *petioli* in quibusdam apice in flagello producti; *laminae* maximæ, flabelliformes vel pinnatæ, vernatione plactiæ, demum secundum venas secondarias longitudinaliter fissiæ, venis interdum filorum specie persistentibus; pinnæ longitudinaliter venosæ, coriaceæ, indumento plerumque pannoso-tomentoso, aut lepidoto, rariusve simpliciter piloso aut nudo. *Inflorescentia* terminalis vel axillaris, varia, sæpius spadicosa. *Spadix* sæpius ramosus, nunc spatha una completa inclusus, nunc pluribus incompletis imbricatim plus minus tectus, nunc apice in filagellum extensus, vel abortivus flagelliformis. *Flores* parvi inconspicui, sæpius glumaceo-coriacei, solitarii vel binati (ambobus masculis) vel ternati (fœmineo nempe inter duos masculos), vel aggregati, in quibusdam in foveolis spadicis sub-immersi, in speciebus monoicis fœminei versus bases ramificationum, masculi versus apices siti. *Fructus* quandoque maximus.*

SUB-FAMILIA.—CALAMINÆ.

Ovarium squamosum vel strigosum. *Fructus* squamis retrorsis loricatus.

Frutescentes et sæpius scandentes, vel arboreae. Foliorum vaginæ petiolique *spinis plano-subulatis vel aculeis sæpissime armati*; laminæ *pinnatae (generis unici orbis novi flabelliformes), pinnis saepissime linearibus, margine et superficie saepius setigeris.* Spathæ *(Ceratolobo excepto) plures incompletae.* Inflorescentia *spicato vel racemoso-paniculata.* Flores *polygamo-monoici vel dioici, utriusque sexus valvati, tribracteati, solitarii, vel binati, ambobus masculis, vel altero faemineo, altero neutro, vel masculo?* Perianthium *striato-venosum.* Corolla *indurata, saepe caspidata.* Stamina 6, *raro* 12, *unius indefinita.* Ovarium *triloculare.* Ovula *solitaria.* Fructus *solitarius* 1-3 *spermus, squamis corneis lovicatus, saepius exsuccus.* Albumen *ruminatum, excavatum, vel aequabile.* Embryo *dorsalis vel prope basin seminis.*

Sub-familia e maxima parte gerontogea, perpaucis Americanis typi aberrantis hucusque detectis. Vita plerumque perennis, Sagi monocarpica. Limes borealis specierum Indicarum 29° 30′.

Usus.—Trunci paucarum arborescentium farina, Sagum dicta, locupletissimi: frutescentium graciliorum aliquarum præbent bacula, scandentium plurium viminibus et funibus sunt quam maxime idonei. Foliis præparatis (Atup editis) tecta domorum struuntur. Fructus nonnullorum ob saporem acidum quæsiti sunt.

* The characters are chiefly taken from the writings of Mr. Brown, and MM. Martius and Endlicher.

FOLIA PINNATA.

1. Zalacca.—Inflorescentia spicato-paniculata. *Spicae amentiformes; bracteolae villoso-paleaceae. Flores binati. Seminis tegumentum baccatum. Albumen vertice excavatum.* Palmæ perennes, subacaules. Flagelli 0.

2. Sagus.*—Inflorescentia spicato-paniculata. *Spicae amentiformes; bracteolae villoso-paleaceae. Flores binati. Albumen ruminatum.* Palmæ *arboreae, monocarpicae.* Flagelli 0.

3. Calamosagus.—Inflorescentia spicato-paniculata. *Spicae amentiformes; bracteolae villoso-paleaceae. Flores solitarii? Albumen ruminatum et vertice excavatum.* Palmæ perennes, scandentes. *Pinnae cuneiformes, supra medium erosae. Ligula maxima, sursum scaphoidea.* Petioli flagelliferi.

4. Calamus.†—Inflorescentia spicato-v. racemoso-paniculata. *Spicae* (interdum racemi) *filiformes, masculae compressae, distichae. Flores solitarii. Bracteolae imberbes, floris masculi in cupulam coaliti. Albumen superficie excavatum vel ruminatum.* Palmæ perennes, sæpius scandentes, et sæpius, vel spadice vel petiolo extenso, flagelliferæ.

5. Plectocomia.—Inflorescentia racemoso-paniculata, *ramis caudiformibus. Spathae distichae, imbricatae persistentes Spicae filiformes. Flores solitarii.* Fructus ramentaceo-hispidi. *Albumen aequabile.* Palmæ perennes scandentes. Petioli flagelliferi.

6. Eugeissona.—Inflorescentia *paniculata. Flores solitarii, terminales, bracteolis pluribus imbricantibus stipati. Stamina indefinita. Albumen solidum, extus sulcis sex exaratum.* Palma perennis, subacaulis. Flagelli 0.

ZALACCA.

Char. Gen.—*Spicae* teretes, amentiformes. *Flores* in gremio bracteolarum 2 villoso-paleacearum, masculi binati, fœminei solitarii vel neutro hinc adjecto binati. *Stamina* 6. *Ovarium* squamosum vel strigosissimum. *Fructus* 1-3-spermus. *Semen* baccatum. *Albumen* apice excavatum. *Embryo* basilaris.

Habitus.—Palmæ *subacaules, eflagelliferæ, caespitosae.* Foliorum vaginæ petiolique *spinis seriatis horridae, spinae saepius faciculatae, directione variae, apice nutantes, in una strictae et ordine regulari alternantes.* Spathæ *incompletae, scariosae, striatae, varie fissae et lacerae.* Spadicis *rami florigeri simplices vel ramosi.* Spacæ *sessiles spathis obinclusae, vel pedicellatae exsertae.* Bracteolæ *in cupulam coalitae, vel parte disrupta septiformi inter flores interposita quae ternatae.* Flores *dioici, vel polygamo-monoici.* Fructus *saepius squamarum apicibus longis retrofractis hispidi. Sarcocarpium seminis tegumenti acidissimus.*

Genus Sago proximum, discrepans habitu (Z. conferta quadantenus excepta), semine baccato, et albumine vertice excavato cæterum æquabili. Ad Calamum variis modis accedit.

* *Raphia* —Inflorescentia spicato-paniculata (*thirsoidea*). *Spicæ compressæ, distichæ. Bracteolæ imberbes. Flores solitarii* Cætera ut

† *Ceratolobus.**—Inflorescentia racemoso-paniculata. *Spatha unica, completa, siliquæformis,* persistens. Palma perennis, fruticosa, calamo flagellifera.

Folia Flabelliformia.

Mauritia.—

* Char: e Martio.

In sectiones 2 (artificiales) commode dividi potest; hæc polygamo-monoica vel dioica? Flori fœmineo f neuter hinc adjectus; illa dioica flore fœmineo solitario.

Characteres auctorum citatorum ad Z. edulem et Blumeanam tantum spectant.

SAGUS.

Char. Gen.—*Spicae* terestes, amentiformes. *Flores* hermaphroditi, masculi, vel polygami, binati, bracte villoso-paleacea utrinque stipati. *Stamina* 6. *Ovarium* squamis obtectum. *Stylus* (sæpius) conico-triangula tridentatus. *Fructus* exsuccus, squamis loricatus, 1-spermus. *Albumen* ruminatum. *Embryo* dorsalis.

Habitus.—Palmæ *Archipelagico-Asiaticae, monocarpicae, trunco robusto saepius elato, corona ampla termin* Folia *pinnata*: vaginae et petioli *spinis rectis saepius armati*; pinnæ *lineari-ensiformes*, Inflorescentia *termina plerumque pyramedalis*, Spathæ *plures, incompletae, inermes vel spinis rectis obsitae.* Flores *plerumque rubescen* Ovaria *(monente Jack) unius fere distincta, aliarum coadunata.*

A Zalacca, cui proxima, differt habitu, semine exsucco et albumine ruminato.

CALAMOSAGUS.

Char. Gen.—*Spicae* teretes, amentiformes. *Flores* hermaphroditi, solitarii, villis semi-immersi. *Stamina Ovarium* squamis obtectum, triloculare. *Stylus* subulatus, tridentatus. *Fructus* exsuccus, squamis loricatus, *Se* vertice excavatum. *Albumen* ruminatum. *Embryo* vagus.

Palmæ *scandentes perennes incolae Peninsulae Malayanae.* Folia *pinnata*; vaginæ petiolique *aculeis con rectis armati*: ligula *maxima, pari modo aculeata, sursum ventricoso-scaphoidea et vaginam contiguam semi-amp tens*; pinnæ *alternae, cuneatae, inaequilaterae, a medio supra vel margine terminali erosae, subtus glaucae.* Inflo centia *Sagi vel Zalaccae.* Spathæ *plures incompletae inermes.* Bracteolæ *in villos fere omnino solutae.*

Genus foliis Caryotæ vel Wallichiæ, habitu quodammodo Calami, inflorescentia et semine Sagi et Zalaccæ, signe forma et evolutione ligulæ.

Character (posthac emendandus) haustus est, quoad flores, e C. lanciniosa, quoad organa vegetationis e harinæfolia. Huc verisimiliter referendus Calamus caryotoides, A. Cunningham. Martius, Palmæ. p. 212, forsan Calamus rhomboideus, Blume. Syst. Veget. ed. Schltes, 7. pt. 2. p. 1332.

CALAMUS.

Char. Gen.—*Spicae* (interdum racemi) filiformes (paniculatæ). *Flores* mono-dioici, (sæpissime) solit masculi bractea et cupula (bracteolis duabus coalitis) suffulti, faeminei tribracteati. *Stamina* 6. *Ovarium* squ plus minus tectum. *Fructus* subexsuccus, squamis retrorsis loricatus, mono-raro dispermus. *Albumen* rumina vel superficie foveolatum. *Embryo* hilo approximatus.

Habitus.—Palmæ *perennes, caespitosae, frutescentes, vel arbusculoideae, erectae vel saepius scandentes. C (saltem partis folliferæ) vaginis obtectus.* Foliorum vaginæ *varie armatæ spinis saepissime seriatis, (in unavertic*

is), plano-subulatis, colore saepe variegatis, interdum longissimis; petioli spinis supradictis vel aculeis vario modo ornati, saepe apice extensi in flagellis subtus aculeis palmatis uncinatis prehensilibus; pinnæ *alternantes regulari ordine, et fasciculatae, lineares, vel lineari-lanceolatæ oblongaeve, in paucissimis cuneato-lanceolatæ, in paucis directione variae, saepius subulato-acuminatae, sæpius hispidae setis subpungentibus secus margines et venas dispositis.* Spadices *axillares, plerumque diffusi, pedunculo saepius cum dorso vaginae contiguae cohaerente ideoque pseudo-extra-axillari, saepius ramati, saepe apice in flagello isto petiolorum simili extensi, vel abortientes omnino flagelliformes.* Spathæ *extimae pinis, aculeis, vel setis varie armatae, vel plures deciduae infima persistente, vel omnes per anthesin persistentes planae et cymbiformes, vel tubulosae cum fructibus permanantes.* Spicæ *masculae saepe scorpioideae, compressae.* Flores *parvi inconspicui, masculi distichi.* Styli *rami plerumque revoluti.*

SECT. I.—(Coleospathæ). *Scandentes vel erectæ.* Spadices *diffusi.* Spathæ *omnes persistentes, tubulose limbis parvis vel obsoletis.*

* *Erectae. Flagelli* 0.

Species 1-4.

** *Saepius scandentes. Flagelliferae, vel spadice abortivo, vel fertili apice extenso.*

Species 5-19.

*** *Scandentes. Petioli flagelliferi.*

Species 20-21.

SECT. II.—(Piptospathæ). *Scandentes. Petioli saepius flagelliferi.* Spadices *mutici, diffusi.* Spatha 1, (*rarius* 2), *infima tantum per anthesin presistens spathis ramorum omnino deciduis.*

Species 22-26.

SECT. III.—(Platyspathæ). *Scandentes. Petiole flagelliferi (an semper ?).* Spadices *diffusi.* Spathæ *omnes per anthesin persistentes, planae, vaginis parvis vel obsoletis.*

Species 27-30.

SECT. IV.—(Cymbospathæ). *Scandentes vel erectae. Petiole saepius flagelliferi.* Spadices *contracti.* Spathæ *cymbiformes, rostratae, diu persistentes, duae externae alias involventes, vaginis obsoletis.*

Species 31-38.

Dæmonorops. *Blume, Martius.*

SEC. V. ?—Ceratolobus, *Blume.*

Genus intricatum, imperfecte cognitum, characteribus auctorum plerumque inextricabilibus, forma partium fructificationis, Cymbospathis forsan exceptis, potius quam vegetationis meo sensu dividendum.

Limites ambigui: Sago appropinquat tribus viis per Calamosagum, Raphiam, et Zalaccam; Plectocomæ per Cymbospathas ?

Calamus secundiflorus, Pal. Beauv. Fl. d'Owar. Benin. habitu, foliis Desmonci, floribus hermaphroditis, et statione geographica differt.

PLECTOCOMIA.

CHAR. GEN.—*Spicæ* (vel racemi) filiformes (paniculatæ). *Flores* dioici, masculi bractea et bracteolis duabus (interdum obsoletis setiformibus) suffulti. *Stamina* 6. *Ovarium* squamis obtectum. *Fructus* exsuccus, 1-3-spermus, squamis retrorsis loricatum. *Albumen* æquabile. *Embryo* basilaris.

HABITUS—Palmae *perennes, scandentes, habitu omnino Calami.* Petioli *in flagellos extensi.* Pedunculi spadicis *spathis imbricantibus omnino vestitus*; rami florigeri *caudiformes subfastigiati, secundi, penduli, spathis subdistichis persistentibus arcte imbricati.* Spicæ *in sinubus spatharum abscondiæ.* Ovarium *squamis (ciliatis fimbriatisve apice luciniatis) tectum. Stylus* tripartitus, ramis subulatis. Fructus *globosi.*

Genus a Calamo inflorescentia praesertim distinguendum. Discrepat etiam bracteis bracteolisque setaceis squamis fimbriatis apice productis, (qua nota ad Zalaccas quasdam accedit), et albumine omnino æquabili.

EUGEISSONA.

CHAR. GEN.—*Inflorescentia* terminalis, paniculata. *Flores* dioici, terminales, (solitarii). *Stamina* indefinita. *Ovarium* squamis obtectum. *Fructus* exsuccus, 1—spermus. *Albumen* cartilagineo-corneum, sulcis sex exaratum. *Embryo* basilaris.

HAB.—Palma *caespitosa, sub-acaulis.* Folia *pinnata*; vaginæ, *et* petiole *infra pinnas spinis plano-subulatis armati*; pinnæ *lineares, vena centruli cujusque paginae setigera.* Paniculæ *4-6-pedales, erectae, aspectu ferrugineo-brunnescentes, spathis arctis undique imbricatae.* Spathae *primariae dorso spinosae apice in flagellum rostratum attenuatae; secundariae muticae secus carinam dorsalem parce spinosae; tertiariae inermes.* Flores *bracteis ribus arcte imbricantibus semi-immersi, maximi.* Calyx *membranaceo-chartaceus, trifidus.* Corolla *tripetala, petalis sublinearibus longis spinoso-cuspidatis, floris foeminei infra medium carinam (stamina abortiva) apice penicillatam exhibentibus.* Antherae *lineares, adnatae.* Styli *tres, intus stigmatosi.* Ovula *solitaria, anatropa.* Fructus *ovatus, rostrato-mammillatus, ovi gallini magnitudine, brunneus.* Semen *erectum exsuccum.*

SUB-FAMILIA.—CORYPHINÆ. *Mart. Palm. p.* 231.

Flores hermaphroditi, rarius polygami, rarius dioici. *Ovaria* 3, discreta aut partim cohærentia. *Fructus* drupaceus vel baccatus, monospermus, ovario unico plerumque tantum maturato. *Albumen* corneum, æquabile vel cavum, vel processu tegumentorum intrante excavatum vel exaratum. *Embryo* sæpius dorsalis, rarissime basilaris.

Palmæ *perennantes vel monocarpicae, frutescentes vel arboreae.* Folia *saepissime flabelliformia, raro pinnata.* Inflorescentia *axillaris, raro terminalis.* Spathæ *plures incompletae, vaginantes, rarius una completa; secundariæ plerique deficientes.*

SECT. I.—FOLIA FLABELLIFORMIA.

CORYPHA.—*Monocarpicae,* arboreæ, terminiflorae. Folia palmatim partita, flabelliformia. *Spathae secundariae tertiariae tot quot rami spadicis.* Flores hermaphroditi, glomerulati. Corolla tripetala. Bacca sicca. succa. *Albumen centro-cavum vel solidum. Embryo verticalis.*

LIVISTONA.—Perennes, arboreæ, axilliflorae. Folia palmatim partita, flabelliformia. Flores hermaphroditi, glolati. Corolla tripartita. Drupa. *Albumen processu intrante excavatum.* Embryo dorsalis.

Licuala.—Perennes, frutescentes, axillifloræ. *Folia pinnatim flabelliformia.* Flores hermaphroditi, solitarii, binati vel ternati? tribracteati. Corolla tripartita. *Filamenta in annulum faucinum saepissime coalita.* Drupa, etc. præcedentis.

Chamærops.—Perennes, frutescentes vel arboreæ axillifloræ. Folia palmatim-partita, flabelliformia. *Flores polygami.* Corolla tripetala. Bacca. *Semen longitudinaliter sulcatum.* Embryo dorsalis.

SECT. II.—FOLIA PINNATA.

Phœnix.

SECT. I.

Folia flabelliformia. *Flores* hermaphroditi, rarius polygami. *Spathæ* plures incompletæ. *Corolla* valvata. *Stamina* 6, sæpius perigyna. *Styli* connati. *Drupe* rarius *bacca. Semen* superficie læviusculum, vel (in Chamæropide) verticaliter sulcatum. *Albumen* centro-cavum, vel processu intrante excavatum, vel (in Chamæropide) exaratum, interdum sub-ruminatum.

Palmæ *frutescentes vel arboreæ, perennantes vel monocarpicæ, in umbrosis humidisque vigentes.* Folia *palmatim vel* (in Licuala) *pinnatim flabelliformia, interdum maxima, plicata, lacinis ut plurimum bifidis:* petioli *inermes vel sæpius seepius marginibus aculeati.* Spadices *perennantium axillares, monocarpicarum terminales, maximae.* Spathæ *plures, incompletae, vaginantes.* Flores *sessiles, solitarii vel sæpe glomerulati, sæpe obscure* 1-*bracteati.* Stamina *in tripetalis liberis, hypogyna, in reliquis perigyna, filamentis sæpe in annulum faucinum coalitis.* Antheræ *versatiles.* Ovarium *sæpius vertice exsculptum.* Baccæ drupæve *olivaceae, rubrae vel cyaneae.*

Paludosæ Americæ tropicæ, Australiæ, et Asiæ præsertim ultrarangeticæ et archipelagicæ. Species una Mediterranea altera Affghanensis. Limes borealis specierum indicarum 30-31 grad. alt. supra mare 1,000—1,500 pedum.

Usus.—Foliorum pinnis exsiccatis inscribere solent indigenæ.

CORYPHA.

Char. Gen.—*Flores* hermaphroditi. *Calyx* tridentatus. *Corolla* tripetala. *Stamina* 6, hypogyna, filamentis basi dilatatis distinctis. *Ovaria* 3, cohærentia. *Styli* connati. *Fructus* (unicus sæpius maturescens) baccatus, monospermus. *Albumen* corneum, centro-cavum (unius solidum). *Embryo* versus apicem albuminis.

Habitus.—Palmæ *asiaticae arboreae, procereae, monocarpicae.* Truncus *annulatus vel spiraliter sulcatus.* Coma *maxima, ampla.* Petiolorum *margines aculeati.* Rete 0. Lamina *palmatim multipartita, laciniis apice bilobis.* Inflorescentia *terminalis, amplissima.* Spathæ *primariae et secondariae plurimae.* Flores *glomerulati, breve pedicellati, flavescentes.* Fructus *olivacei seu flavescentes.*

Affinitas proxima cum Livistona (confer R. Br. Prod. p. 123, adnot.) Discrimina majora constant in vita monocarpica, inflorescentia terminali et spathis secondariis.

LIVISTONA.

Char. Gen.—*Flores* hermaphroditi. *Perianthium* utrumque triparitum. *Stamina* 6, filamentis e corolla liberifactis distinctis, (basi dilatatis). *Ovaria* 3, apice cohærentia. *Styli* connati. *Stigma* subsimplex. *Drupa* (unica maturescens) monosperma. *Albumen* cavitate ventrali. *Embryo* dorsalis.

Habitus.—Palmæ *Asiae orientalis et australis, saepius arboreae, perennantes.* Foliorum petioli *saepius armati;* laminæ *segmenta profunde bipartita, interdum acuminatissima pendula, lateralia longiora.* Rete *copiosum.* Spadices *axillares, paniculatim ramosi; pedunculis* spathis *vaginantibus obtectis.* Flores *minuti, albidi, glomerulati.* Drupæ *saepius inaequilaterales, glaucescenti-azureae,*

Discrimina vera inter Licualam et hoc genus ponuntur tantum in foliis palmatim flabelliformibus, filamentis in annulum liberum vix coalitis et baccis azureis. Fructus structura in utroque eadem.

CHAMÆROPS.

Char. Gen.—*Flores* polygamo-mono-dioici. *Calyx* tripartitus. *Corolla* tripetala v. tripartita, *Stamina* filamentis basi coalitis. *Ovaria* tria. *Styli* 0. *Baccae* 1-3, monospermæ. *Semen* in facie ventrali sulcatum, *albumine* ruminato-variegatum. *Embryo* dorsalis.

Habitus.—Palmæ *perennantes, frutescentes vel arboreæ, nanae vel procerae.* Rete *saepius amplum.* Petioli *margine denticulati, vel spinosi, vel sublaeves.* Lamina *palmatim multipartita;* laciniæ *induplicatae, apice saepissime bilobae, filis intermediis saepius nullis.* Spadices *simpliciter aut composito-ramosi.* Spathæ *coriaceae tubulosae, rameae paucae vel deficientes.* Flores *flavescentes, bracteati.* Filamenta *basi connata.* Baccæ *carne spissa parca, olivaeformes vel subrotundae.*

"Numerus partium haud raro auctus; loco ternarii quaternarius, quinarius vel senarius."

Affinitate proxima Livistonæ. Præbet transitum ad Phœnicem per flores polygamos, staminum numerum auctum, baccas et structura seminis.

SECT. II.

Folia pinnata. *Spatha* una completa. *Flores* dioici. *Corolla* fl. fæminei convoluto-imbricata. *Stamina* 6-9, raro, 3, hypogyna. *Pistilla* 3, discreta. *Bacca. Semen* longitudinaliter exaratum.

Palmæ *perennantes, nanae et subacaules, frutescentes vel arboreae, saepius gregariae et locos aridos amantes.* Truncus *petiolorum cicatricibus vel basibus asper, rarius annulatus.* Petioli *inferne planiusculi depressi, superne compressissimi.* Rete *panniforme, copiosum.* Pinnæ *saepius fasciculatae, plurifariae, rigidae, glaucescentes, conduplicatae vel conduplicato-canaliculatae, venis diaphanis parallelo-strictae, rarius solitariae, bifariae, flaccidae, planiusculae; infimae in spinis degenerantes.* Inflorescentia *axillaris.* Spatha *completa, coriacea, bicarinata, primum antice aperiens, demum dextrorsum et sinistrorsum bivalvis, postremum decidua.* Spadix *saepius exsertus, racemi in modum ramosus, pedunculo compresso.* Spicæ *fasciculatae,* subfastigiate *saepius simplices.* Flores *masculis, angulati.* Calyx *urceolatus, tridentatus.* Corolla *tripetala.* Stamina *hypogyna, saepius* 6. Antheræ *adnatae.* Pistillum *rudimentarium (an semper?)* Flores *fœminei convoluto-clausi.* Calyx *maris.* Petala 3, *rotundata, carnoso coriacea, convoluta.* Stamina *sterilia* 6. Ovaria *distincta.* Styli *distincti, recurvi.* Stigmata *subsimplicia.* Bacca *saepius oblonga, rubra vel demum nigrescens.* Albumen *aliquando ruminatum.* Embryo *centralis vel prope basin.*

Incolæ Africæ occidentalis et borealis, et præsertim Asiae tropicæ orientalis. Limes borealis specierum indicarum 30° grad; australis 5° grad.

Praebent farinam (*Sago* speciem), succum vinosum *(Taree)* et prae alia Saccharum. Fructus (Phaenicis dactyliferæ) edules, Arabis et Persicis aestimatissimi. Folia unius tegetibus apta, et petioli corbulis.

SUB-FAMILIA.—ARECINÆ

SECT. I.

Spathæ 1 *vel* 2, *sæpissime completae.* Perianthium *faemineum convoluto-imbricatum.* Fructus *sæpe obliquus.* Folia *pinnatim fissa vel pinnata.*

ARECA.—Spathæ 1-2, *completae. Florse monoici in eodem spadice.* Stamina 3-00. Ovarium 1-3-loculare, 1-ovulatum. *Drupa,* rarius bacca obliqua. Folia pinnatim fissa vel pinnata.

BENTINCKIA.—Spathæ 2, *interior completa. Flores monoici in distinctis spadicibus, basi in foveolis immersi.* Stamina 6. Ovarium triloculare, 1-ovulatum. *Bacca ? obliquissima.* Folia pinnata.

SLACKIA.—Spathæ 2, *incomptetae,* vaginantes. *Flores monoici in eodem spadice, basi in foveolis immersi.* Stamina 6, filamentis basi coalitis. Ovarium triloculare. *Drupa obliquissima. Albumen ruminatum.* Folia pinnatim fissa.

SECT. II.

Folia *pinnata vel bipinnata, pinnis vel pinnulis erosis.* Inflorescentia *centrifuga.* Spathæ *plures incompletae.* Corolla *faeminea valvata.* Stamina *saepius indefinita.*

* *Flores monoici in eodem spadice.*

CARYOTA.—*Folia bipinnata.* Stamina 00. Ovarium 1-2-loculare. Bacca 1, raro 2-sperma. *Albumen ruminatum.*

** *Flores monoici in diversis spadicibus vel dioici.*

ARENGA.—Folia pinnata, *pinnis linearibus, basi* 1-2 *auriculatis.* Stamina 00. Ovarium *triloculare.* Bacca *vertice depresso trigona, trisperma.* Albumen æquabile.

HARINA.—Folia pinnata, *pinnis cuneatis. Flores interdum dioici. Stamina in quibusdam* 6. Ovarium *biloculare.* Bacca *disperma.* Albumen æquabile.

SECT. I.

Spathæ 1-2 completæ, rarius incompletæ, rarissime nullæ. *Flores* mono-dioici vel polygami. *Perianthium* fæmineum convoluto-imbricatum. *Stamina* 3-00, sæpius 6. *Ovarium* 1-3-loculare, sæpius 1-ovulatum. *Fructus* sub-drupaceus æquilateralis, vel subbaccatus iuæquilateralis. *Semen* 1. *Albumen* ruminatum, interdum æquabile. *Embryo* sæpius basilaris.

Palmæ *elegantes, frutescentes vel arboræ, sæpius graciles, sæpe arundinaceæ, in umbrosis vigentes.* Corona *sæpius ampla.* Folia *pinnatim fissa (imo aliquando bifurca) vel pinnata, pinnis reduplicatis, saepius oblique acuminatis.* Inflorescentia *universalis centripeta, partialis centrifuga.* Spadix *axillaris, paniculatim vel racemosim divisus, raro indivisus, saepe refractus, interdum coloratus.* Flores; *fæmineus sæpiusinter duos masculos, (superiores saepe tantum masculi), binati, distichi, interdum suaveolentes.* Stigma *plerumque trilobum.*

Incolæ præsertim Asiæ archipelagicæ et oceanicæ; una cultissima prope mare, plures sylvicolæ, paucæ maritimæ. Limes borealis sp. indicarum 27-28. grad.

USUS.—Albumen astringens narcotica, inebrians Arecarum plurium Asiaticis cum calce et folio Piperis Betel manducatur. A. Catechu hanc ob causam præ palmas alias indicas (Cocos nucifera excepta) abunde colitur. Vaginæ foliorum (A. Catechu) consutæ haustrorum in usu adhibentur. Trunci A. tigillariæ asseres stabiliores præbent.

Euterpe. *Gaertn. op. cit.* 1. *p.* 29, *t.* 9.

Pinanga. *Rumph. Hb. Amb.* 1. *t.* 4.

Caunga. *Rheede Hort. Mal.* 1. *t.* 5—8.

ARECA.

Char. Gen.—*Spathae* 1 vel 2, completæ. *Flores* monoici in eodem spadice, fœmineus inter duos masculos. *Stamina* 3-00. *Ovarium* 1-3 loculare. *Ovulum* 1. *Fructus* drupaceus vel sub-baccatus monospermus, interdum 3-locularis. *Albumen* ruminatum. *Embryo* basilaris.

Habitus.—Palmæ *arboreae vel frutescentes, sæpius inermes.* Truncus *annulatus.* Folia *pinnatim fissa, rarius bipartita vel pinnata;* vaginæ *coriaceae, striatae.* Spadices *axillares, paniculatim vel racemosim divisae, rarius simplices, saepe refracti.* Flores *saepe distichi, plerumque evolutione centrifugi.* Antheræ *lineares.* Drupa *ovatae, saepius aurantiacæ,* baccæ *globosæ, coerulescentes.*

Sect. I.—(Pinanga). *Spathæ* 2-completæ, rarius 1. *Spadices* erecti, paniculatim ramosi. *Flores* inferiores 1 fœmineus inter duos masculos, superiores masculi binati. *Stamina* 3-12, sæpius 6. *Drupa.*

Frutices inermes, interdum soboliferæ, vel saepius arbores. Folia *pinnatim fissa, rarius pinnata.* Spadicis rami *dorso deficientes.* Fl. fœm. perianthii *foliola interiora longiora.*

Sect. II.—(Anaclasmus). *Spatha* 1, completa. *Spadices* refracti, racemosim 2-5-divisi, interdum simplices. *Flores;* 1 fœmineus inter duos masculos. *Stigma* discoideum, sæpe lobatum. *Drupa.*

Inermes, frutescentes. Folia *pinnata.* Fl. fœm. perianthii *foliola* 3 *interiora breviora.*

Seaforthia. *Martius.* (vix Brown). Pinanga. *Blume. Endl. Gen. p. 1370. No. 1727-1.?*

Sect. III.—(Euoplus). *Spathæ* 2, completæ. *Spadices* racemosim divisi, ramis 00, fastigiatis, caudæformibus pendulis. *Flores;* sæpius 1 fœmineus inter duos masculos. *Fructus* sub-baccatus, obliquus, cœrulescens.

Arboreæ vel arborescentes, soboliferae, armatae. Folia *pinnata.*

Oncosperma. *Blume. Endl. Gen. p.* 1371, *No.* 1727-3.?

Genus imperfecte cognitum, verisimiliter in posterum in plura dividendum.

Seaforthia, Br. differt habitu Caryotideo et floribus fœmineis inter duos hermaphrodito-masculos; horumque stylo longo.

BENTINCKIA.

Char. Gen.—*Spathae* 2, vel plures, intima completa. *Flores* monoici in distinctis spadicibus, aut rarius polygami, e foveis tandem emergentes, masculi alternatim distichi, fœminei solitarii. *Masc. Stamina* 6. *Faem. Ovarium* triloculare. *Ovulum* 1. *Bacca* obliquissima (stigmatibus basilaribus). *Semen* sulcatum. *Albumen* solidum. *Embryo* basilaris.

Habitus.—Truncus *tenuis, arundinaceus, annulatus.* Frondes *pinnatae.* Spadix *infra folia urumpens, paniculatim ramosus, rubescens.* Flores *parvuli, compage subglumacea, rubentes.* Baccæ *purpurascentes, parvulae.*

SLACKIA.

Char. Gen.—*Spathæ* 2, incompletae, vaginantes. *Flores* monoici in eodem spadice, e foveis tandem emergentes; fœminei inferiores, solitarii vel masculo adjecto, masculi superiores, binati. *Stamina* 6, filamentis basi coalitis, (fl. fœm. castrata). *Ovarium* gibbum, 3-loculare, 1-ovulatum. *Stigmata* 3. *Drupa* obliquissima (stigmatibus basilaribus). *Albumen* corneum, simpliciter ruminatum. *Embryo* basilaris.

Habitus.—Palma *malayana, arecaeformis, fruticosa.* Folia *pinnatim fissa:* rete 0. Spadices *axillares,*

nutantes, ramis (spicis) *simplicibus, saepius* 2, *aliquando pluribus.* Flores *subglumacei, albidi.* Drupæ *nigrescenti-purpureae, obovato-oblongae.*

Genus Bentinckiæ proximum, discrepans spathis et albumine ruminato. Folia etiam pinnatim fissa. Habitus Geonomæ, quod genus differt filamentis in columnam connatis, antherarum loculis divaricatis, stylo (ovarii virginei) [illegible]ari et albumine æquabili.

Dicatum beato Henrico Slack, botanico magnæ spei, ætate iniente infelici casu abrepto.

SECT. II.

Spathae plures, incompletae. *Flores* monoici (vel interdum polygami)? in uno vel distinctis spadicibus, vel dioici; masculi binati, cum vel absque fæmineo interjecto. *Corolla* fæminea valvata. *Stamina* sæpissime indefinita. *Ovarium* 2-3-triloculare, 2-3-ovulatum. *Bacca* 1-3-sperma. *Albumen* æquabile vel (in caryota) ruminatum. *Embryo* dorsalis.

Palmæ *monocarpicae, interdum ope sobolum perennantes, frutescentes vel saepius arboreae.* Folia *pinnata vel bipinnata:* rete *fibrosum:* pinnæ *vel* pinnulæ *varie erosae, lineares vel saepius cuneatae, saepius fasciculatae, subtus saepius albidae.* Spathæ *imbricatae, pedunculum vestientes.* Spadices *axillares et terminales,* (*in speciebus monoicis saltem*) *evolutione inversi,* spicis *saepius pendulis, fastigiatis.* Sepala 3, *imbricata.* Petala *totidem* (*vel* corolla *tripartita*). Antheræ *lineares, adnatae.* Ovula *solitaria.* Succus *acris, urens.*

Palmæ monticolæ sylvicolæque, incolæ e maxima parte orbis veteris et præsertim Archipelagi orientalis. Limes borealis specierum indicarum 27°-28° grad., altit. supra mare 4,000 pedum.

Usus.—Trunci integri pro asseribus, excavati pro aquæductubus, fissi pro telis utuntur. E tela trunci centrali [illegible]ri, farina, *Sagum* edita, paratur. Retis fibræ *(Ejoo)* in funes in aquam diutius stabiles torquentur. Succus re[illegible] *(Toddy),* coctus Saccharum *(Cabong)* præbet et albumen immaturum cum saccharo conservatum condimenta. [illegible]que tomentum vaginarum igniario est idoneum.

ARENGA.

Char. Gen.—*Flores* monoici in diversis spadicibus (vix semper). *Stamina* indefinita. *Ovarium* triloculare. [illegible] vertice depresso-trigona, sub-triloba, trisperma. *Albumen* æquabile. *Embryo* dorsalis.

Habitus.—Palmæ *spectabiles, arboreae, monocarpicae, raro soboliferae.* Truncus *annulatus, apicem versus petiolorum basibus saepius quasi squamatus.* Folia *pinnata;* rete *copiosum fibris rigidis nigris intermixtum:* petiolus *interdum aculeatus;* pinnæ *lineares, fasciculatæ et plurifariae, vel solitariae bifariae, subtus albidae, basi uno vel utroque latere lobato-auriculatae, apice eroso-dentatae truncatae vel dentatae, vel bilobae.* Spadices *nutanti-pendulae;* spicis *pendulis, saepius fastigiatis caudae equinae in modum dispositis.* Flores *majusculi.* Antheræ *mucronato-opiculatae.* Baccæ *virdescentes, rotundatae, majusculæ.* Semen *(endocarpio cohaerente)? saepius baccatum, saepius evenium.* Succus *acris.*

CARYOTA.

Char. Gen.—*Flores* monoici, fæmineus inter duos masculos. *Stamina* indefinita. *Bacca* sub-exsucca, sæpius monosperma. *Albumen* ruminatum. *Embryo* dorsalis.

Habitus.—Palmæ *elegantes, saepius procerae, monti-sylvicolae, monocarpicae, interdum ope sobolum perennan-* [illegible] Trunco *concinne annulatus.* Folia *bipinnata amplissima;* rete *tenue fibrillosum;* pinnulæ *cuneatae oblique*

praemorsae, erosae, pagina utraque concolori. Spadices *nutanti-penduli.* Spicæ *pedulae, saepius fastigiatae, caudae equinae in modo dispositae. Fl. fœm.* stamina rudimentaria *tria.* Baccæ *subglobosae, rubescentes.* Succus *acerrimus.*

Specierum octo tres tantum satis bene cognitæ; aliæ recognoscendæ, tum fusius tum accuratius definiendæ.

HARINA.

Char. Gen.—*Flores* mono-dioici. *Masculi* binati. *Stamina* 6 vel indefinita. *Faeminei* solitarii vel masculo utrinque stipati. *Bacca* sub-exsucca, 1-2-sperma. *Albumen* æquabile. *Embryo* dorsalis.

Habitus.—Palmæ *cæspitosae, humiles, frutescentes, soboliferae* (an semper)? *aliquando arundinaceo-truncis monocarpicis.* Folia *pinnata;* rete *fibrosum;* pinnæ *infimae saepius fasciculatae, superiores solitariae, e basi cuneata integerrima varie labatae dentataeve (lobis dentibusque spinuloso-erosis), striato-veniae, subtus albidae et nigro punctulatae.* Flores *mono-dioici, vel polygami in diversis spadicibus, vel monoici in eodem spadice;* Spadices *masculi, vel axillares inversa ordine evoluti, nutanti-penduli, ramosissimi spicis fastigiatis e maxima parte spathis inclusis; vel* (Oraniæ) *terminales, parce ramosi, spicis exsertis.* Flores *inferiores per paria dispositi cum vel absque fœminei rudimento; superiores solitarii.* Spadices *faeminei terminales, ramis paucis exsertis, interdum simplices.* Spicæ *apice attenuatae, polygamæ?* Flores *solitarii, bi-tribracteolati.* Fructus *oblongi, interdum obliqui, rubri vel albi.* Succus *causticus.*

MACROCLADUS.

Char. Gen.—*Flores* monoici, fœminei utrinque masculo stipati. *Spatha* duplex, interior completa, clavato-fusiformis, lignosa. *Corollae* valvatæ. *Stamina* 6. *Ovarium* triloculare, loculis 1-ovulatis. *Fructus* subsiccus. *Albumen* cartilagineum, æquabile. *Embryo* lateralis.

Habitus. Palma *malayana, spectabilis, inermis.* Corona *haemisphaerica, densa.* Folia *pinnata, pinnis linearibus, apice irregulariter dentatis vel lobatis, subtus albidis.* Spadix *axillaris, paniculatim ramosus.* Flores *albi, minuti.* Fructus *globosus, albidus.*

Folia et flores fœminei quodammodo Arengæ, spathæ Cocos, fructus Coryphæ.

Locus naturalis mihi ignotus: ad calcem Arecinarum interim posui. Affinis Euterpe montanæ, Graham, Bot. Mag. t. 3874, quæ cum charactere generico citato saltem quoad spathas minime convenit.

FINIS.

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